GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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Editorial Notes.

Best Wishes
for a
Happy Christmas
to all our Readers.

The Coal-Pricing Schemes.

THE schemes before the country for the control of coal production and marketing will mean an increase of prices to consumers. That is plain; and it is not a condition that the industries of the country can contemplate with any degree of composure. They are already worried sufficiently over their own production costs, which place them at a disadvantage with competitors for markets not only overseas, but at home through imports of more cheaply made goods and materials. The attitude of the coal industry is to-day that of "every industry for itself;" and pursuit of the easiest course in attaining the end. Other industries are desirous of knowing whether the coal industry has done, or is doing, all possible within itself to realize economies and efficiencies which would reduce the costs of production, and make unnecessary control of production and regulation of price. However, whether or not they like it, coal consumers are faced with this course of procedure on the part of colliery owners, who claim justification on economic grounds, while coal is being raised and vended at lower prices in other countries.

South Wales has its Coal Marketing Association; and it is understood that the details of the scheme are taking shape, and will soon be completed. Interest now centres on what is being done in Yorkshire, Nottinghamshire, and Derbyshire, as the scheme there includes the regulation of production, with penalties for infraction, which is not the case in South Wales. The West Yorkshire coal owners last Friday gave practically a unanimous vote in favour of production control and price regulation. The South Yorkshire owners met, we think for the third time, on the 13th inst.; and without coming to an agreement, they separated with the view of going fully into the matter with their officials. It is expected that the Nottinghamshire and Derbyshire owners will be favourable. The advocates of the scheme are also hopeful that a large majority of the South Yorkshire owners will be in favour; but it is stated that the scheme will not be operated unless it applies to 90 p.ct. of the tonnage raised in the areas. It is also reported that the Lancashire owners are considering their position in relation to their neighbours' organization. Warwickshire and Leicestershire, too, may not like to be left out in the cold.

Looking at the matter how one will, it is perfectly obvious that the scheme will cause prices to ascend for home consumers. The owners in the three counties make no secret of the fact that their purpose is to boost export trade, and to relieve the home market of an excessive supply of coal, which has the effect of depressing prices below the economic level. The views of the colliery owners as to what will constitute "an economic level," is not explained. We shall probably know soon enough. It is announced that there is to be a levy on all coal raised of 3d. per ton to operate the scheme, and to assist in the development of the export trade. That 3d. per ton is the price consumers are to pay to produce a system to operate against themselves. As to the part of the scheme for regulating output according to the trade situation, there is to be a penalty of 3s. per ton on over-production above 1 p.ct., with power to deal more severely with systematic offenders by increasing the penalty and reducing their production quota. But any excess of the quota up to 1 p.ct. may be carried forward and be deducted from the next month's quota. Another feature of the scheme is that control is to be exercised by an organization to be known as the Central Collieries Commercial Association; the machinery for operations under their authority being a Basic Tonnage Committee, a Quota Committee, and an Exports Committee. Big interests and a large concentration of power are involved in this organization.

It must be remembered that we are only at the birth of these coal production controlling and selling schemes. Everything has a beginning; and most things grow. What these schemes will expand to in their influence upon coal purchase in this country cannot be predicted.

Silica Horizontals.

WHEN the members of the Southern Association of Gas Engineers and Managers discuss the paper which Mr. Stephen Hay, of the Beckton Works of the Gas Light and Coke Company, submitted at the recent meeting, they will find plenty of subject-matter upon which to dilate from their own experiment or experience. We have already published the paper itself, and to-day reproduce in later columns the informative appendix in which Mr. A. Edwards, the Works Chemist, gives the results of his researches into the chemical and physical aspects of failures with silica. It is only on a large works that such a thorough exploration as is presented in this paper can be made of relative values and troublesome effects

and their causes in connection with such a subject as horizontal silica retorts; and there is therefore indebtedness to Mr. Thomas Hardie, the Chief Engineer of the Company, for permitting Mr. Hay to use the records, and to Mr. W. B. Leech, Engineer at Beckton, for the advice and assistance he rendered in planning the experimental work. In the result we have a remarkably edifying paper, illustrated by instructive diagrams and photographic reproductions. The contribution is opportune, for it will help to clarify the situation in respect of silica retorts, and to dissipate some of the theories extant regarding experienced difficulties, and will direct to future avoidance. We do not mean to imply that we have here a settlement of all questions relating to the subject; such a submission would, we feel sure, be quickly wrecked when the discussion takes place. But it can be said that the author has assembled so many considerations bearing upon the question that the paper forms a good starting ground for reconsideration and debate, critics always remembering the exceptional area of experience which the resources of Beckton provide.

The need for realizing a high yield of gaseous therms demands high temperatures; and this has led at Beckton to the exclusive use of 95 p.ct. silica retorts. High temperatures such as are now practised are unfriendly to the life (in days) of fireclay retorts, and have tended to shorten it substantially, and therefore the gain in thermal yield has to be discounted by the increased expenditure that has to be incurred in more frequent renewal. In this connection there can be ready agreement with Mr. Hay's preference for presenting "life" in tons of coal carbonized rather than in the number of days worked. Tonnage treated gives us definite performance; days of working, only an indefinite measure of accomplishment. The tons of coal carbonized supply the only basis of comparison between retorts of different materials; just as the therm yield, and not the volumetric, affords the only true comparison between production per ton by different carbonizing systems. That by the way. The virtues of silica retorts are now well known. The superior conductivity enables the working of heavy charges and allows shorter duration; increases throughput, and therefore reduces manufacturing costs; gives greater flexibility in regulating stocks of gas; and increases the tonnage carbonized in the life of the retorts. It was in 1922 that the silica segmental retort was adopted as a standard at Beckton; and the hope of those responsible is that settings built within the last two or three years will give considerably over 2000 days' life, and that the tonnage of coal carbonized will exceed 3400 in 20 ft. retorts, and 4000 in 23 ft. retorts. There is support for this belief in settings built in 1925 and 1926, special examination of which discloses excellent condition, with only a few segments showing cracks between the division walls.

In order, however, to realize a good working life, there must be scrupulous supervision during the building of the settings, and after-care. The advantages of silica retorts are not obtained for nothing. The engineer who is interested in this subject—and what gas engineer is not in these days when plant longevity in terms of work done, and economically high therm production per day per retort, are essentials?—will find many suggestions drawn from the experience at Beckton and applied there in practice. As an example, Mr. Hay deals with that much-discussed question of after-expansion. He characterizes as unsound and unnecessary to-day certain of the methods of construction in retort-settings which have been suggested to counteract the effects of expansion. It is a good dictum that expansion should take place equally throughout the setting; but silica material from the bottom retort upwards is necessary to ensure this. The experience at Beckton has resulted in the view that allowances for expansion should be made about the periphery of the silica work adjacent to the pier walls and main arch, and not in the body of the built-up work. Mr. Hay emphasizes this: "In the construction of the setting, the "closer the approach to a monolithic whole, the better. "To this end, joints should be as thin as the surface of "the shapes allows. Open work and partially filled joints "should be avoided at all costs."

An arresting feature of the paper is the discussion of failures; and many preconceived ideas in this relation are discarded by Beckton. Mr. Hay deliberately declares that he has not seen a failure of a silica retort which could be ascribed to high-temperature working. Failures are generally due to one or other of these causes: Faulty design of the setting; mechanical crushing by stoking plant; inferior jointing cement; patching with fireclay or siliceous material; iron attack. The holing of silica retorts is a subject which has been much discussed lately, and to it Mr. Edwards has been giving special attention in his investigations. The theory that attack on silica retorts is from the inside has been abandoned at Beckton. The progress of attack has been carefully watched, with the result that there is conviction that there is no attack on silica from flue gases. Then the opinion regarding slagging on account of dust in producer gas has been examined by having in a bed siliceous retorts in one tier, and silica retorts in another tier, facing the same combustion chamber, and heated by the same producer gas. The illustrations show that, after 950 days' work, the siliceous retort surfaces were obviously slagged and covered with tear drops of slagged material, while the silica material was unaffected. A great number of failures, it is believed, have been due to the use of unsatisfactory jointing material. Another source of failure arises from the destructive action of coke ash in joints which become open through movements in the setting. Analyses of iron stain zones in the proximity of failures leaves little doubt that, even with cement above suspicion, it is essential to make every effort to preclude the possibility of foreign matter entering the joints. To this end, makers of refractories, Mr. Hay urges, should use every endeavour to produce segments of low porosity combined with perfect shape and even, smooth surfaces. He also advocates the adoption of standard sections of retorts, as this would effect economies in the cost of the moulds, which economies should be reflected in the prices. And manufacturers will notice the further suggestion that, if it were possible to mould, burn, and handle silica in larger pieces, it would be preferable to have the bottom of a complete ring made in one piece. One retort maker is, the author says, attempting to produce such a section.

Beckton favours shallow retorts. Working tests have determined this, and have led to the decision to alter the 24 in. by 18 in. sections to 24 in. by 16 in. throughout the works. It is noticed, too, that stress is laid upon the point that the full benefit of silica can only be assured when the retorts are filled to 60 p.ct. or over. Making the retort shallower reduces the thickness of the bed of coal in it, while maintaining a charge which occupies the same proportion of the available space. The reduction of retort depth at once raises the question of the utilization of the old mouthpieces. But this has been negotiated by having a special clay piece to connect the mouthpiece to the retort; the slight incline from retort to mouthpiece assisting in the discharging. An important point, too, is that the superior conductivity of silica over fireclay has a substantial effect upon throughput. This is a matter over which it is difficult to speak in definite terms; but Beckton believes that it is due to silica that the throughput has been increased by 20 p.ct. Mr. T. Carmichael, of Portsmouth, in his Institution paper of last June, credits silica with promoting a 30 p.ct. increase in throughput. Thus, if this figure is right for Portsmouth, then the estimate for Beckton may be taken as a conservative one. Further evidence of high result is that in one retort-house at Beckton, with retorts only 20 in. by 16 in. section, and 20 ft. long, 120 therms per retort per day is considered to be average working. On the point of flexibility, Beckton produced in December last year its maximum day's make of 106 million c.ft.; and without fear of damaging the retorts and settings, temperatures were increased and the duration of the carbonizing period was reduced, with the result that there was an increase from 106·7 to 120·5 therms per retort per day. To the virtues of silica, all this is excellent testimony from extensive practice.

Speaking from the experiences at Beckton, Mr. Hay submits that failures of silica in the past have originated solely from faulty design and indifferent material and workmanship; and, having learned what to avoid, he

believes that for temperatures exceeding 1350° C. in combustion chambers, silica is not only an undoubted acquisition in, but is essential to, the advancement of carbonizing efficiency on gas-works. We have indicated the large scope for discussion that the paper provides, and yet have not exhausted its points. It is a richly informative contribution to a highly important element in gas-making economics.

Noxious or Offensive Gases.

It is proposed to extend the Alkali Works Regulation Act of 1906, with a view to supplementing the list of noxious or offensive gases mentioned in section 27, and enlarging the list of works given in the first schedule. Such extension is, of course, natural in view of new knowledge, discovery, and invention in the chemical industry; it is merely the outcome of progress. Dr. T. Lewis Bailey, Chief Inspector under the Alkali Act, has held a public inquiry into the proposals; and it must have been a gratification to him to find that there were no objections to the draft Order which has been framed, but that those who were before him were there merely seeking information. The Association of British Chemical Manufacturers and the National Gas Council, for instance, were represented, but offered no opposition. The Order does not apply to Scotland. It should be made clear that it is not intended that all "noxious gases" shall automatically come under inspection. The whole range may some day; but at present inspection is definitely limited to specified works—the whole object being to deal only with noxious gases or fumes which are a danger to public health and a nuisance. Among the plants to which extended descriptions are to apply are tar works; the added words being: "And works in which creosote or any other product of the distillation of gas tar or coal tar is distilled or is heated in any manufacturing operation involving the evolution of any noxious or offensive gases." From what Dr. Bailey said, it has been necessary to take action in this regard because serious complaints have arisen through fumes evolved from the mixing of dehydrated tar and pitch. It is not difficult to get rid of this nuisance; and suggestions have been made by the inspectors which have removed the trouble. It could probably be achieved by altering the method of mixing. In mixing a current of air with hot materials, there is naturally a considerable evolution of fumes which carry a long way, and the smell is not at all pleasant. A simple means, it has been suggested, is to pass the fumes through a scrubber; and it is found that in this way the whole nuisance has been prevented. Other useful elucidating points were brought out at the inquiry; but they were, of course, more interesting to our chemical friends than to those directly responsible for gas-works operations.

Panel System of Gas Heating.

To the several plans of utilizing gas for room and space heating, Mr. A. H. Barker, B.Sc., B.A., adds the panel low-temperature radiation system. Introduction to this was made at a meeting of the London Gas Salesmen's Circle, as reported in our issue for Dec. 14. Panel heating is a relatively new form of warming in large buildings; and gas must be in the swim. For the purpose, it has virtues and therefore recommendations; and prominent among them is the fact that it is so easily handled, and is economical—indeed, the whole of the gross heat of the gas is used to heat the panels. That is why Mr. Barker turned his attention to inventing means for utilizing it for the purpose, with the result that he claims it is considerably cheaper than any other method of heating by gas, and probably cheaper than any method of central heating. Such claims will cause a very careful investigation of the system to be made by the gas industry, which is on the look-out for all plans which offer new fields of application for its primary product. In the new system, a bunsen burner is employed, consuming from 5 to 10 c.ft. an hour; and this is used to heat a large radiating plate (in the form of panels) fixed to the surface of the wall. The heat is distributed over the plate by the products of combustion flowing through cast-on channels, lined with a non-corrosive material; withdrawal of the products, and discharge to the open air, being performed by an electric fan. The gas is automatically extinguished when the fan stops, and automatically turned-on again when the fan starts, so that with a pilot light in each chamber, the apparatus can be turned on and off at will, and be automatically regulated by a thermostat. Provision is made for the removal of the condensate. If the greater part of the heating is by radiation, then there will not be the oppressiveness experienced in a room in which the major heat is of the convected order. Mr. Barker declares, from actual experience, that a room can be heated to an equal degree of comfort by this method at an expenditure of heat about 60 p.ct. of that required by a convection method—such as a gas radiator. As to running costs, an attractive comparison is made towards the end of the paper. Taking a room of a capacity of 2500 c.ft., it would require with a gas radiator $\frac{1}{10}$ therm per hour at a standard cost of 1d. A gas fire would require twice this amount, costing (say) 2d. per hour. The cost of the new method of panel heating would be $\frac{1}{2}$d. per hour, as compared with $\frac{3}{4}$d. per hour with a coal fire, and $\frac{1}{4}$d. per hour with a standard hot water radiator, with all the attendant labour in feeding and cleaning the fire. The new system is said to be applicable to both large and small rooms. It will be interesting to learn of the development in application of this promising system.

Our Next Issue.

In view of the Christmas Holidays, it will be necessary to send the next issue of the "JOURNAL" to press earlier than usual. We shall therefore be glad if correspondents will arrange for communications intended for that number to reach us not later than the first postal delivery on Friday next.

Railway Rates for Gas-Stoves.

At the last meeting of the Central Executive Board of the National Gas Council, it was reported that, working in conjunction with the Traders' Co-ordinating Committee, concessions had been sought with regard to the carriage of gas fires and cookers. The railways, it is stated, have agreed to give relief in these cases by placing the goods in a lower classification. Details will appear in the monthly report of the Council.

German Developments.

The German Dye Stuffs Corporation have already a capital of £55,000,000; and their business extends to the manufacture of dyes, fertilizers, and heavy chemicals of almost every description. It is announced that the capital is to be increased by £12,500,000; the money being required for "the extension of newly opened-up spheres." The report says that one sphere is to carry out, on a great scale, a new process for the liquefaction of coal—in other words, the production of synthetic oil from brown coal or lignite. The process, it is indicated, is distinct from the Bergius method. It is expected that the production of synthetic oil by the new process will reach the prescribed quantity by the end of next year. Unofficially this is placed at 200,000 tons. Further information is that an agreement between the Trust and the French chemical industry is about to be signed; but negotiations with the English chemical industry have not yet reached any definite result. Even if agreement is not effected in the immediate future, the resumption of negotiations is possible when conditions are more favourable.

Rating Inquisition.

In the "JOURNAL" for Nov. 2, there was published a remarkable list of questions which had been sent to a gas undertaking by a local rating authority, and comment was made upon it. From the minutes of the Central Executive Board of the National Gas Council, we see that the question of notices by rating authorities, under section 40 of the Act of 1925, has been considered by the Rating and Valuation Committee of the Conjoint Conference of Public Utility Associations. In the result, it has been agreed that there is no obli-

gation to answer questions which deal with matters of opinion as opposed to matters of fact, or to give particulars relating to capital expenditure or values, seeing that these facts are not reasonably required for assessing an hereditament, the value of which is ascertained by reference to the accounts, receipts, or profits of the undertaking. It was further resolved that the best course for undertakings to adopt would be to forward to the rating authority copies of the accounts of the undertaking for (say) the past three years, and to offer to supply any further reasonable particulars which might be required.

Imports of Coal to France.

The restrictions on the import of British coal to France have been removed.

Coal Output.

During the week ended Nov. 5, the amount of coal raised was 4,762,100 tons; the number of workers being 981,100. In the week ended Nov. 12, the output was 4,864,500 tons; the number of workers being 978,800. In the week ended Nov. 19, the production was 5,072,600 tons; the number of workers being 977,900. In the week ended Nov. 26, the quantity raised was 4,934,600 tons; the number of workers being 978,500.

Steel Safeguarding.

Some 136 Unionist members of the House of Commons have signed a statement in the form of a motion, which has been handed to the Prime Minister by Mr. Reginald Clarry, urging the introduction of a reasonable measure of safeguard in the home market for British steel. A year or two ago the Committee of Civil Research rejected an application to the Government for safeguarding the heavy sections of the iron and steel industry. Now the question is being revived; but, of course, the matter cannot be dealt with before next session, by which time probably Mr. Clarry will have obtained additional signatures. During recent months the imports of iron and steel have been progressively climbing to high figures over the monthly average of 1913.

Engineers' Wages.

It is announced that the Joint Trades Committee consisting of representatives of all the trade unions in the engineering industry of Greater London, have decided to recommend the district committees of all the affiliated unions to endorse a renewed application for an increase of 20s. a week on base rates in the Metropolitan area. The national wage agreement, under which the federated employers conceded a special bonus of 2s. per week to all "plain time" workers of 21 years and over, will expire on Jan. 31; and the London area appears to to be intent upon forcing a revival of the national demand for 20s. increase all round. The 2s. special bonus was accepted by a vote of 81,575 to 41,527 in the membership of the "A.E.U.;" and it affected the wages of 165,000 workpeople.

Municipal Hot Water.

The Paris correspondent of the "Daily Telegraph" makes an interesting statement regarding a decision of the Municipal Council to supply the inhabitants with steam heat and hot water with the view of doing away with fires and stoves, and eliminating the smoke nuisance. We do not for a moment suppose that it will have such a drastic effect. The idea is that the system shall be installed by a concessionaire, with whom a contract will be made for forty years, though the city, which will collect a portion of the receipts, will reserve the option of taking over the undertaking after twenty years. The first effort (which it is expected will be the work of five years) will be made in a municipal building at Bercy, from which steam heat and hot water will be supplied to 7000 flats in a radius extending to the Opéra. The pipes, it is stated, will be laid in tunnels; and the cost is estimated at about £102,000 a mile. We do not know the basis of computation, but it is claimed that this method of heating will not be dearer than the ordinary system. Taking the present price of coal, it is calculated that heat can be sold at 15 to 20 c. per 1000 calories.

PERSONAL.

Mr. J. W. NAPIER, Engineer and Manager of the Alloa Gas-Works, has just attained his 25th year of service in that capacity, and on Saturday last was made the recipient of hearty felicitations and a valuable souvenir of the event by five gentlemen who have been his Assistants during his quarter of a century of service. A deputation of these gentlemen called on Mr. Napier at his residence, Mansfield, Alloa, headed by Mr. Arch. Kellock, now Engineer and Manager of the Airdrie Corporation Gas-Works, and presented him with a gold cigarette case, with their autographs engraved under the inscription, as follows:

> J. W. Napier, Esq., from former and present assistants at Alloa, on the occasion of his semi-jubilee as Engineer and Manager of the gas undertaking.
>
> ARCHIBALD KELLOCK (Airdrie).
> GEORGE N. MITCHELL (Blackburn).
> LAURENCE FARQUHAR (Peebles).
> GEO. P. LAURIE (Dunoon).
> WM. SCOTT (Alloa).
>
> Dec. 14, 1927.

Mr. Kellock, the "Senior Assistant" present, made the presentation in a happy speech—recalling his pleasant and profitable relations with Mr. Napier while acting as his assistant many years ago, and conveying the good wishes of himself and the other subscribers to their old friend on this auspicious occasion. Mr. Napier feelingly acknowledged the gift.

Mr. J. T. TURPIE, of Middle Duckmanton, Chesterfield, has been appointed Manager and Secretary of the Mold Gas and Water Company, and took up his duties there on Monday, the 19th inst. Mr. Turpie received his training at Rugby, and was successively Secretary, Engineer, and Manager of the Grange and Cartmel District Gas and Water Works Company, and Engineer and Manager of the Dronfield Gas Light and Coke Company.

Mr. H. GREIG, B.Sc., Chief Chemist to the Sunderland Gas Company, has been appointed Assistant Superintendent of the Gas-Works of the Rio de Janeiro Light, Power, and Tramway Company. He leaves Sunderland to take up his new appointment early in January.

OBITUARY.

The death occurred on Dec. 1 of Mr. JOHN MCCUBBIN, formerly Engineer to the Hong Kong and China Gas Company. Mr. McCubbin, who was 59 years of age at the time of his death, commenced his career in the gas industry at Greenock. Thence he migrated to Chorley, where he was Gas Manager for five years. In 1901 he went to China as Engineer of the Hong Kong gas undertaking, and remained in the service of that Company for 22 years.

The many friends of Mr. E. L. WIDDOWSON, M.I.M.E., will have heard with deep regret of his death, which took place at Leatherhead on Nov. 14 last. He appeared to be in perfect health up to within a few days of undergoing a serious operation for acute appendicitis. A second operation was necessary five days later. Complications followed, and he died within a week of being taken ill. Mr. Widdowson will be well remembered as a representative for many years of Messrs. Drakes, Ltd., of Halifax, and later as General Manager of Columbus Machinery, Ltd. He was a member of the Evening Star Lodge. Our sympathies are extended to his sister and father, to whom he showed deep affection and devotion.

Mrs. MARTIN, only daughter of Mr. John Mackenzie, representative of Messrs. Sawer & Purves, of Manchester, London, and Nottingham, died, we are sorry to learn, at Bylands, Redbourn, Herts, on Sunday, the 18th inst.

MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

Jubilee Celebration.

The Midland Association of Gas Engineers and Managers attains its jubilee on Jan. 10 next; and it has been unanimously decided to celebrate the event.

A jubilee dinner, to be followed by a dance and cabaret entertainment, is to be held on Thursday, Jan. 26, at the Queen's Hotel, Birmingham. (Reception at 6 p.m. for 6.30 p.m.) It is expected that several eminent gentlemen in the industry will be present; and no effort is being spared to make it a really successful, happy social function. Members are at liberty to bring their friends. Ladies are particularly invited.

The members have decided to present to the President in future a souvenir of his year of office; and it is being arranged to make a presentation of these souvenirs to all Past-Presidents on the occasion of the above jubilee celebration.

Information as to admission tickets may be obtained from members or the Hon. Secretary (Mr. T. Thornton, Gas-Works, Rowley Regis, near Birmingham).

NATIONAL GAS COUNCIL.

Minutes from the Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council took place on the 13th inst., at 28, Grosvenor Gardens, S.W. 1.—Sir DAVID MILNE-WATSON in the chair.

RADIATION, LTD.

The attention of the Board was drawn to statements which had appeared in the Press regarding allegations as to the emoluments of the Directors of this firm; and it was stated that a Shareholders' Committee was being formed in connection therewith.

It was decided to set-up a small Committee to consider and report upon the position and its bearing upon the gas industry.

RIGHT TO DEPRECIATE GASHOLDERS IN ADDITION TO CONTRIBUTING TO SPECIAL PURPOSES FUND.

It was reported that, in connection with the promotion of a Special Order under section 10 of the Gas Regulation Act, the question had arisen as to the powers of statutory companies to depreciate gasholders in cases where there was a special purposes fund by debiting an annual sum to the revenue account and crediting the capital account with a like figure.

It was decided to set-up a small Committee to advise the Council in the matter.

RATING AND VALUATION ACT, 1925.

(*a*) *Notices by Rating Authorities under Section 40 of the Act.*—It was reported that this matter had been considered by the Rating and Valuation Committee of the Conjoint Conference of Public Utility Associations; and it was finally agreed that there was no obligation (*a*) to answer questions which dealt with matters of opinion as opposed to matters of fact, or (*b*) to give particulars relating to capital expenditure or values, seeing that these facts were not "reasonably required" for assessing a hereditament the value of which was ascertained by reference to the accounts, receipts, or profits of the undertaking carried on therein. It was further agreed that the best course for undertakings to adopt would be to forward to the rating authority copies of the accounts of the undertaking for (say) the past three years, and to offer to supply any further reasonable particulars that might be required.

(*b*) *Fees paid to Rating Experts.—Income-Tax.*—It was reported that the Conjoint Conference of Public Utility Associations, to whom this question had been submitted by the Council, had agreed that counsel's opinion should be taken. The opinion will appear in the Council's monthly report.

STANDING COMMITTEE ON MINERAL TRANSPORT.

It was reported that the Committee appointed by the Board at their last meeting had met the original Committee appointed by the Board to consider the evidence that might be submitted to the Standing Committee appointed by the Minister of Transport and Secretary of Mines; and recommendations had been made with regard to the standardization of wagons, which would be incorporated in a memorandum, together with a recommendation with regard to the pooling of wagons, for submission to the Standing Committee.

RAILWAY RATES.

(*a*) *Classification of Gas Cookers and Fires.—Deductions from Standard Charges when Damageable Goods are carried at Owners' Risk.*—It was reported that the Council, working in conjunction with the Traders' Co-Ordinating Committee, had asked for concessions with regard to gas stoves and gas cookers, and that the railways had agreed to give relief in these cases by placing them in a lower classification. Full details of the new classification would appear in the Council's monthly report.

(*b*) *Continuance of Exceptional Rates.*—The best means of safeguarding the position of the gas industry with regard to the continuance of such exceptional rates was considered.

PUBLIC HEALTH (SMOKE ABATEMENT) ACT, 1926.—DRAFT RULES EXTENDING THE OPERATION OF THE ALKALI, &C., WORKS REGULATION ACT, 1906.

It was reported that the effect of these draft rules was to bring within the operation of the 1906 Act benzole rectification plant and pyridine plant, and also benzole washing plant where creosote or other oils were used as absorbing agents for benzole and such oils were subsequently distilled. It was stated that an inquiry was being held by Dr. Lewis Bailey at the Ministry of Health on the 14th inst., when anyone interested could be heard; and it was agreed that Mr. Fottrell (Joint Manager) should attend the inquiry.

FEDERATION OF BRITISH INDUSTRIES.

The following representatives of the Council were re-appointed to this body:

Main Group 9, Sub-Group 1 of the Grand Council (Chemicals, Fertilizers, and Explosives).—Mr. C. F. Botley and Mr. T. Hardie.

Main Group 14, Sub-Group 3 of the Grand Council (Public Utilities).—Mr. Bradfield, Mr. F. W. Goodenough, and Mr. W. J. Sandeman.

GAS CHARGES COMMITTEE.

Mr. Botley (Chairman of the Committee) stated that the report of the Committee would shortly be available; and he was satisfied that when members had the report in their hands, they would understand why it had taken some time to prepare.

ELECTRICITY SUPPLY MEMORANDA.

A MAN of great courage is Mr. R. Moritz, K.C. He recently gave the readers of the "Evening Standard" his views regarding "the truth about the Electricity Act." The sub-heading to the article left nothing to be desired in respect of pungency. It read: "Parliament hoodwinked, the public deluded, while the householder saves—nothing." Unhappily, he does not say precisely who hoodwinked Parliament, and who deluded the public. We know that certain politicians did a large amount of talking, and airily spoke about matters of which their own words convicted them of knowing nothing, but which caused a large amount of misleading throughout the country. We do not agree with all Mr. Moritz says; but we believe he is not far wrong when he declares that the scheme is one of the biggest delusions ever foisted upon a credulous public in our time, and a close study clearly demonstrates the nakedness of the land. We are also at one with him when he says that all the saving that can be effected in the cost of generation will not make a great deal of difference, if any, to the consumer, who will find economy in generation offset by expenses and waste in distribution and transforming. There came what purported to be a "reply" to Mr. Moritz from one of "the greatest authorities on electricity in England," who, though "great" was so bashful that he preferred to remain anonymous. The "great authority on electricity" said that people who are committing themselves to statements like those made by Mr. Moritz will feel very sorry for themselves before long. Why? The opinion is a mere generality—a thin veneering of a very uncomfortable situation. He talked at large on the reduction of the capital charges which the curtailment of spare plant is going to bring about; but if he is a "great authority" on electricity supply, he will know that Mr. Archibald Page, the Chief Engineer to the Central Electricity Board, has issued a warning that there is little hope of the industrial areas of the country getting, through the scheme, electricity at a cheaper rate than they do now from their own generating stations. He must also be aware that the transmission lines and the transforming stations with their maintenance and running costs will represent more expenditure than will be compensated by the gain from concentrated generation. All "great electricity authorities" know that.

Delusions.

The "great authority" made a conspicuous point of the question of spare plant, which, under the new order of things, is going to be small compared with the aggregate of the spare plant in the present stations; but he says nothing about the reduction of the margin of safety which will be brought about by diminishing the aggregate of spare plant. The more generation is concentrated in one spot for a large area, the more important is it that there shall be an effective margin of spare plant. But the infallible authors of the scheme tell us that the linking-up of the various power stations will provide additional safety. If a large station has only 10 p.ct. of spare plant, and anything happens to place another equally large station out of action, the spare 10 p.ct. of plant at the former will not go far in rendering relief without robbing the area normally supplied from the befriending station. With such a small margin of spare plant, a breakdown at one station will be a disastrous matter for a very large area. Assuming ten stations of equal size, then the aggregate

Spare Plant and Safety.

of 10 p.ct. of spare plant at them will only be equal to the capacity of one station.

Supplies of Energy from a Private Plant.

There are some people in Caerphilly who find it pays them to obtain their electricity supply from a local draper, who is also a large property owner. He is Mr. Victor George Griffin. He has a private generating plant, and supplies from it not only himself, but his lessees and tenants. The District Council do not like this; and their resentment went to the length of taking the matter before Mr. Justice Russell in the Chancery Division, with the result that they and the electricity industry have received a nasty shock. On the point as to the legal right of Mr. Griffin to act as he is, his Lordship said the case depended upon the application of section 23 of the Electric Lighting Act, 1909. It provides that where in any area a local authority or person is authorized to supply electricity, it would not be lawful for others to do so. But there is a proviso that the section shall not prevent any other person from supplying electrical energy where his business is not primarily that of supplying electrical energy to customers. Mr. Griffin's business, said his Lordship, is not primarily that of supplying electrical energy; it is that of a draper and property owner. The action therefore failed, and was dismissed with costs.

Electric Heating.

We are approaching mid-winter; and people have had plenty of occasion to use their heating equipment. The best system of heating to adopt is one which can be used either occasionally or generally, without bringing one to poverty. Excepting in bedrooms, something more than occasional heating is required; and for general heating electricity is out of it. Mr. A. G. Bostel has been writing in "Electrical Industries" on the subject of electric fires. He finds that the "marvellous improvements" that have been made in design have made the electric fire "an unrivalled and pre-eminent means of supplying that occasional warmth in our homes which is so much needed." That is merely the point of view of the electrical man, and not of the gas man, who claims that his system of heating is "unrivalled and pre-eminent" for occasional heating, because, whether for occasional or long-hour use, it is much cheaper than electricity for any temperature needed in a room. We have not seen any improvements latterly in the electric fire that are "marvellous." A real "marvellous" improvement would be not in the fires themselves, but in a long flight in the efficiency of electricity generation, which would bring it as an agent on the same plane (say) as gas in regard to cost. There is a noticeable absence of energy consumptions and costs in Mr. Bostel's article. However, he calls attention to the various types of electric heaters. The bowl or pedestal fire, loaded to 500 watts, with a trunnion parabolic reflector is said to be "a wonderful seller." It appeals to the public because of the amount of heat which is directed from the reflector, and by the fact that it can be connected to an ordinary lamp holder, although it is as well not to advise this when the loading is anything above 500 watts on a 200-volt circuit. Of course, the amount of heat which is "directed from the reflector" cannot be in excess of the amount of heat that would be distributed in the room without the reflector. No one can extract from a unit of electricity more than its actual heat value. The reflector can only concentrate the heat emission. Mr. Bostel has not much to say about the "great army" of electric fires "constructed in all designs to suit any period from the humblest home to the richest." That is not well put. A humble or a rich home is not a "period." Mr. Bostel seems rather favourably inclined to the construction of a fire to stand in the centre of a room to radiate heat all round, so that people may sit in any part of the room and feel the radiant heat. To our mind, such fires would present a treble danger—first, on account of the trailing wire; secondly, there would always be the risk of dresses coming in contact with them; and, thirdly, they would stand a good chance of being knocked over. We should think the insurance companies would have something to say about such unstable and unguarded heaters. Reference is also made to the low-temperature system of heating by means of elements placed in steel tubes. But that is only a partial solution of the heating problem; such methods being totally inadequate, without a supplementary source of heat, in cold weather. Some people, too, do not like heating by convection, but prefer radiant heat. We admire their choice.

Sliding-Scale Prices and Dividends.

In connection with the widespread complaints in London regarding the difference in prices charged for electricity in neighbouring areas, the London and Home Counties Joint Electricity Authority have found it necessary to issue an official statement. There appears to be an impression abroad that the prices chargeable by the companies are governed by the standard prices to be fixed under agreements entered into between the London County Council and the London Companies. Of course, the standard prices have no direct relation to prices actually charged; but merely regulate the amount of the dividends which the Companies are entitled to pay. The statement points out that the companies are unfettered in respect of fixing selling prices, except that they must not exceed a certain maximum price; and they cannot pay higher dividends than the standard ones, unless the prices charged for current are below the standard prices. In this event, if there are profits available, a sum equal to one-sixth of the amount involved in the reduction of prices to consumers may be used for the payment of an additional dividend to the shareholders. Although the arrangement statutorily took effect as from Jan. 1, 1926, the investigations necessary for the fixation and approval by the London County Council of standard prices are complicated, and have involved prolonged negotiations. But it is now announced that the Council, and the majority of the Companies, have reached an agreement upon the various calculations to be taken into account. When an agreement as to the basic figures has been reached, standard prices must be fixed for each of the following classes of consumers: (*a*) Railway and traction supplies. (*b*) Bulk supplies. (*c*) Street lighting supplies. (*d*) Supplies to private consumers. It is the duty of the Electricity Commissioners to decide the manner in which the standard prices for each of these classes of consumers are to be determined. The Authority are informed that the Commissioners have not yet come to a conclusion upon this point. As soon as the investigations have been completed by the London County Council and the Electricity Commissioners, the standard prices will no doubt be published, and will date back to Jan. 1, 1926.

Mishaps.

Parts of Westminster experienced another collapse of the electricity supply on the 12th inst.; the areas affected being Victoria Station and Buckingham Palace Road. The supply failed soon after five o'clock; it was restored, and then later a twenty minutes' stoppage occurred. In some streets, including Vauxhall Bridge Road, the street lamps were extinguished. The artistes at the Victoria Palace had to dress by candle light; and during the performance the lights were extinguished three times. Through the fusing of a main electric cable, the district of Shaw, near Oldham, was without a supply for an hour on the evening of the 15th inst. Cotton mills had to close early; and shops had to use candles. The Birmingham papers report a failure on the Stratford Road tramway route on the 12th inst. This appears to be only one of several suffered recently by passengers on this line. The beginning of what might have been a serious fire was discovered at Whitley Partners, Ltd., of Hunslet Road, Leeds, on the 9th inst. The watchman found the flooring alight on one of the upper floors. The Fire Brigade quickly dealt with the trouble; but several square yards of flooring and joists were destroyed. The electric wiring is charged with the offence. The blowing-off of the lid of an electric junction box and the shooting of flames into the air heralded darkness in the busiest shopping quarter of Grimsby last Saturday week. There was the usual scamper for the friend in need of electricity consumers—the dear old candle.

JUBILEE OF INSTITUTE OF CHEMISTRY.

The Institute of Chemistry of Great Britain and Ireland celebrated its jubilee on Thursday evening with a dinner at the Hotel Great Central, Marylebone—the President, Prof. ARTHUR SMITHELLS, in the chair.

The following message was read by the CHAIRMAN from the Prince of Wales: I am glad to be able to congratulate the Institute of Chemistry of Great Britain and Ireland on the completion of fifty years of useful service. The application of science to the daily life of the community becomes more and more apparent; as a consequence the activities of such societies as yours have an ever-increasing value. The Institute has established a standard of professional education and qualification for the practice of the profession of chemistry—a standard which, I believe, is now recognized in every field of work in which the science is pursued. I am satisfied that nothing is more important at the present day for the well-being of our national industries than that they should utilize to the utmost the resources of science, and know that this applies in a high degree to the science of chemistry. I have, therefore, not only to congratulate the Institute on its past achievements in advancing the efficiency and status of the profession which it represents, but to express my best wishes for its increased prestige and influence.

FORTHCOMING ENGAGEMENTS.

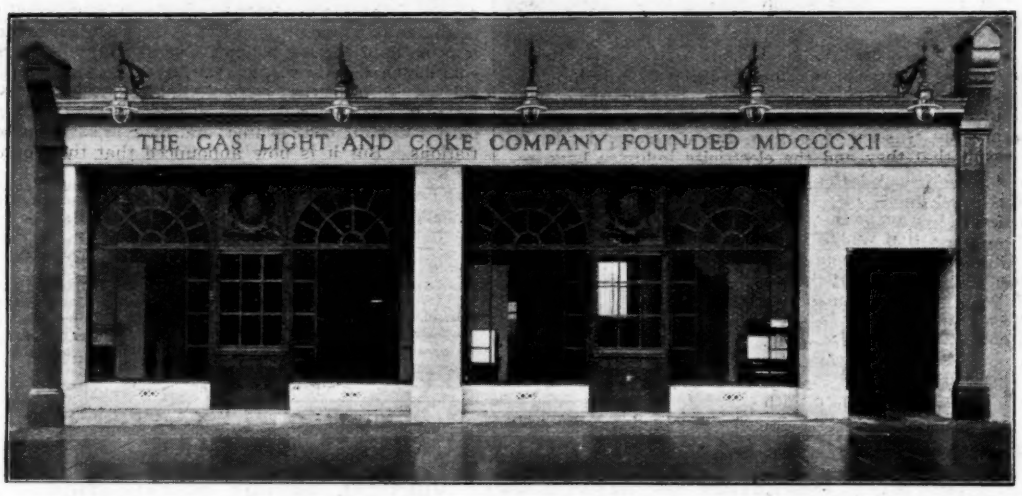
Jan. 10.—NATIONAL GAS COUNCIL.—Meeting.
Jan. 10.—FEDERATION OF GAS EMPLOYERS.—Meeting.
Jan. 26.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Jubilee dinner, followed by cabaret, at the Queen's Hotel, Birmingham.

INSTITUTION OF GAS ENGINEERS.

Jan. 9.—Emergency Committee. Finance Committee.
Jan. 10.—Gas Education Executive Committee.

NEW SHOWROOMS FOR HAMPSTEAD.

GAS LIGHT AND COKE COMPANY'S EXTENDED SERVICE.



Their customers in the important Hampstead district will derive great benefit from the opening of handsome new showrooms and district offices at 235-237, Finchley Road, N.W., by the Gas Light and Coke Company, who will on their part be enabled thereby the better to cope with the constant expansion of their business in that area. Centrally situated, and completely equipped, these showrooms provide a further example of the well-established policy of the Company to assist their consumers in every practicable way to secure the greatest possible value for the gas for which they pay, and to give them such good service as will ensure their full satisfaction.

THE OPENING CEREMONY.

The opening ceremony was performed on Wednesday last, Dec. 14, by his Worship the Mayor of Hampstead (Councillor E. Collingwood Andrews, M.A., M.D.), who was accompanied by the Mayoress, and was supported by many of the aldermen, councillors, and principal officers of the Hampstead Borough Council, as well as leading members of local Chambers of Commerce. The visitors were welcomed by the Governor of the Company (Sir David Milne-Watson, D.L., LL.D.), and other members of the Court of Directors. With the Directors there were the Assistant General Manager (Mr. R. W. Foot), the Secretary (Mr. W. L. Galbraith), the Chief Engineer (Mr. T. Hardie), the Accountant (Mr. H. E. Ibbs), the Rental Superintendent (Mr. L. M. Simmons), the Chief Officer of Stores (Mr. W. McDowall), and the Controller of Gas Sales (Mr. F. W. Goodenough) and the Deputy-Controller (Mr. Stephen Lacey), together with Senior Officers of the Gas Sales Department. To the latter is entrusted the task of giving good service to the 1,250,000 consumers in the Company's area.

On the arrival of the guests, little Miss Joyce Collins presented the Mayoress with a bouquet, and the Mayoress gave her a gold brooch. The party then proceeded to the general office, where tea was served, after which,

CLEANLINESS AND PURITY.

SIR DAVID MILNE-WATSON said it was a great pleasure to welcome the Mayor of Hampstead and the Mayoress, and to ask them to declare these new premises open. He felt the honour of their coming to do so was very great; for anyone occupying the position of Mayor of a large and important Borough like Hampstead found great demands upon his time. The Gas Light and Coke Company appreciated all the more the presence of the Mayor and Mayoress of Hampstead on this occasion, inasmuch as his Worship presided over a Borough Council who possessed their own electricity undertaking. It showed, at any rate, that there was absolutely no ill-feeling between the two industries. ["Hear, hear."] He welcomed also the presence of the Electrical Engineer of the Borough, and hoped that he would be deeply impressed by all that he saw there. Though in a sense they might be rivals, the Company had very friendly feelings towards the electrical industry. There was no doubt that there was scope for both these great industries. To a certain extent each had special fields which it developed to the utmost of its ability; but each would be very foolish not to realize that it had its limitations. The chief aim, he thought, of both the Company and the Council was to see what they could do to render the air of London cleaner and purer. Thus each of them was performing a very useful public service, in which remarkable success had been achieved. Though mists were natural to such a climate as this, fogs of the character of those which prevailed in London even as recently as twenty years ago were practically non-existent now; and this was due to the abolition of so many smoky coal fires. It was unnecessary for him to dwell upon the help which gas had rendered to the housewife. The premises in which they were assembled provided yet another example of the Company's policy of taking the showrooms to their customers. Instead of expecting consumers to go considerable distances, as they had to do in former times, the Company provided a large number of easily accessible showrooms in the principal shopping centres throughout their district. It was felt that the important Borough of Hampstead should have central showrooms to provide service for its 100,000 inhabitants; and he hoped they would avail themselves fully of the facilities thus provided. There would be found in the showrooms, in addition to the strictly utilitarian appliances, many really beautiful articles which would grace any position, however decorative that position might be. He would now ask the Mayor and Mayoress formally to declare the premises open. [Applause.]

THE COMPANY CONGRATULATED.

THE MAYOR OF HAMPSTEAD said he regarded so large an attendance on such a wet afternoon as a happy augury for the success of the showrooms. The Gas Light and Coke Company rendered valuable services to the community; and those who remembered what gas lighting and gas heating were in the past, were astonished at the advances that had been made. He was glad to know the Company were not even now standing still, but were seeking to improve their methods, so that further progress might be anticipated in the future. It was necessary to bear in mind how great were the uses of gas, particularly to the poorer classes. He congratulated the Company upon the admirably arranged booklet which had been circulated; and upon the stupendous figures which it contained. The co-partnership system, as practised by the Company, seemed to him to be a most admirable mode of furthering the interests of the employees and of securing faithful service from them. All present were greatly indebted to the Governor and to the Company for their hospitality, and for this excellent opportunity of inspecting the latest methods of gas lighting, heating, and cooking. "It only remains for me," concluded the Mayor, "to declare the premises open, and to wish that success may come to them just in the way the Company may desire." ["Hear, hear."]

THE SHOWROOMS DESCRIBED.

From all points of view, there can be nothing but congratulation—and this was freely voiced on the opening day—for all who have been concerned in the provision of this new "service centre" in connection with the Company's activities. The Architect responsible for the design, arrangement, decoration, and furnishing of the building is Mr. W. J. Tapper, A.R.A., President of the Royal Institute of British Architects; while the building contract was carried out by Messrs. Chinchen & Co., of Harlesden.

The scheme of decoration—and it is one which would prove difficult to better—is carried out in the tints of grey which have been selected by the Company for other showrooms. The effect is highly pleasing; and everything displayed is seen to the greatest possible advantage. After the ceremony, there was a thorough inspection of the premises.

Here, again, the excellent course has been followed of arranging the ample window space to afford an uninterrupted view of the interior of the ground floor of the showrooms. This is divided into two parts, for the display of cookers and fires. At the further end there are a cashier's counter and an inquiry counter. On the first floor one finds a model kitchen, with examples of the latest adaptations of gas to meet the domestic needs of the community. There is a hot water section, fully equipped with coke stoves, circulators, geysers, wash boilers, &c., as well as a tempting display of artistic lighting fittings, gas irons, and small appliances of various kinds. The floor above this will eventually be occupied by the district inspectors and their staffs serving the three districts which will

be attached to the new showrooms. In the basement, provision is made for a staff dining room and kitchen; and there is convenient accommodation also for the automatic meter collectors.

AMAZING STATISTICS.

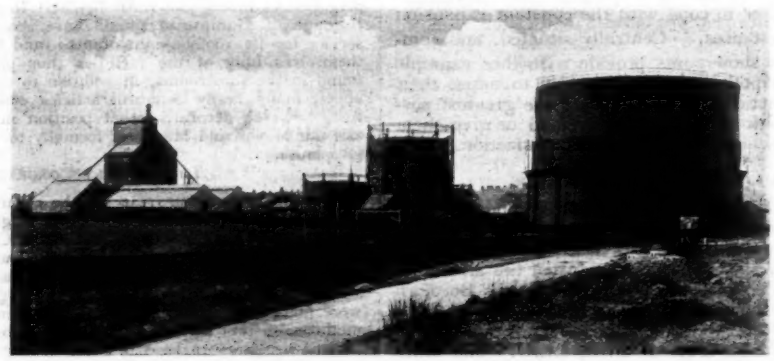
Guests at the opening ceremony were presented with copies of a neat booklet describing the purposes of the showrooms and setting-out some of the more striking figures relative to the Company's business. From this one learns that the Company is growing faster to-day than at any time in the past fifty years. Fifty thousand gas fires have in the past three years been installed in working-class homes; and this means less dirt and drudgery for many thousands of working women. For nearly a century-and-a-quarter now the supply of gas in London has never failed. Day and night a fleet of the Company's steamers are bringing coal from the North of England —2½ million tons of it a year. With regard to the bye-products, it is pointed out that in wallpaper, linoleum, and printing ink factories Gas Light and Coke Company blues are being used. Millions of gallons of special road tar from Beckton are used every year on British roads; while every year millions of railway sleepers, both here and in America, are "pickled" in creosote from the same source. Again, over 20,000 householders have, in the last twelve months alone, made contracts with the Company for a supply of coke for domestic hot water boilers.

Gas sold	46,000,000,000 c.ft. a year (Containing heat energy equal to nearly five times that of the electricity sold in the whole of the "South Eastern Area," thirty times as large as the area of the Gas Light and Coke Company, and including the whole of London.)
Pennies collected from slot meters	800,000,000 a year
Miles of mains (excluding smaller service pipes)	3825 (Equal to more than half the diameter of the world.)
Capital raised	£35,228,885
Employees' interest in the Company (under the co-partnership scheme)	£750,000
Number of employees	20,000
Area supplied	265 square miles
Coal used	2,500,000 tons a year
Coke made	1,600,000 tons a year
Tar made	Over 20,000,000 galls. a year
Oil used	20,000,000 galls. a year

NEW CARBONIZING PLANT AT HOYLAKE.

OFFICIAL INSPECTION OF GLOVER-WEST VERTICAL RETORT INSTALLATION.

There was an official opening on Wednesday, Dec. 14, at the works of the Hoylake and West Kirby Urban District Council of an installation of Glover-West vertical retorts, and other plant; the function being preceded by luncheon at the Royal Hotel. Mrs. Banks, wife of the Chairman of the Council, opened the gateway leading to the works.



GENERAL VIEW OF THE WORKS, SHOWING THE GLOVER-WEST VERTICAL RETORT INSTALLATION.

Gas was first supplied in the district by the Hoylake and West Kirby Gas and Water Company, Ltd., in 1880. The undertaking was transferred to the Urban District Council of Hoylake and West Kirby by an Act of Parliament passed in 1925. By this time the annual sale of gas had exceeded 102 million c.ft., and an extension of gas making plant became a matter of pressing importance. Mr. Arthur Valon, M.Inst.C.E., who had acted as Consultant to the Council before and during the transfer of the undertaking, advised the installation of modern carbonizing apparatus and the re-arrangement of the plant, concentrating the manufacture of gas on one site. The system of carbonization to be adopted was very carefully considered by the Gas Committee and the Council, with the assistance of Mr. Valon and their Manager (Mr. A. G. Readdy, F.C.I.S.), and a contract was placed with West's Gas Improvement Company, Ltd., of Manchester, for the installation of twelve Glover-West vertical retorts of the 33-in. "New Model" design, complete with all necessary foundations, buildings, coal and coke handling apparatus, and waste-heat recovery plant. The nominal daily capacity of this plant is 666,000 c.ft. of gas of a calorific value of 500 B.Th.U. when carbonizing good quality gas coals.

The design and construction of the foundations for the new installation were confided to West's Rotinoff Piling and Construction Company, Ltd. Pre-cast ferro-concrete piles, 14 in. square for the retort bench and 12 in. square for the lighter loads, were driven to an average depth of 45 ft. through the glacial drift which overlays the new red sandstone at this point. Spanning between the groups of piles, caps and beams in ferro-concrete were arranged to form bases for the stanchions and brickwork of the retort bench and retort house. The loads on the coal-store foundations being of much less magnitude, a reinforced concrete raft was laid for the floor, with beams to take the roof stanchions. On excavating for the coal breaker and receiving hopper pits, the clay was found to be sufficiently strong to take the distribution load without the addition of reinforced concrete.

COAL AND COKE HANDLING PLANT.

Coal is brought to the carbonizing plant in railway wagons upon a siding from the L.M. & S. Railway. The wagons are tipped by overhead electrically driven apparatus arranged so that the contents of the wagons may be discharged from either end. The coal is received in a steel hopper placed below the railway. From the hopper it is raised by a fixed-bucket elevator and delivered to a West coal breaker of the two-roll type, in which it is reduced to a size suitable for the carbonizing plant.

ARTHUR VALON, M.Inst.C.E., Consulting Engineer.

A. G. READDY, F.C.I.S., Gas and Water Manager.

The broken coal falls to the buckets of a line of West's lip-bucket conveyor-elevator which encircles the retort house. In this conveyor, the broken coal is elevated and distributed in the

GLOVER-WEST VERTICAL RETORT HOUSE, COAL STORE, AND BOILER AND EXHAUSTER HOUSES.

overhead coal storage bunkers, which, with a capacity equal to forty-eight hours' supply of coal to the retorts, are placed above the retort bench, with openings in direct communication to the several coal valves above each individual retort.

Coke is discharged from the retorts direct to the buckets of the same conveyor, and elevated and delivered to the coke storage hopper placed at the end of the retort house, with shoots for the supply of railway wagons or the producer feeding buggy. Shoots are also arranged so that coal can be discharged from the top strand of the conveyor into the coal store, and so that coke can be discharged and stored in the yard.

Buildings.

The retort house is of the steel-framed, brick-panelled design usual in installations of Glover-West vertical retorts. The coal store is a self-braced steel structure, with 4½ in. and 9 in. brick filling, designed to withstand the pressure of the coal. The boiler and exhauster houses are built of brick with steel roof structures; and the whole is designed to harmonize with the remainder of the gas-works buildings.

Miscellaneous and Auxiliary Plant.

The retort house is amply provided with platforms, staircases, and ladders, giving easy access to all parts of the carbonizing and coal and coke handling plants. The several units of the breaking, elevating, and conveying plant are driven by electric motors operating on alternating single-phase current, with a periodicity of 50 cycles per second and at 230 volts. The coke extractors are driven through the standard Glover-West reciprocating gear from the main driving shaft of the conveyor motor, with a "National" gas engine as an alternative.

The carbonizing plant is equipped with exhaust registers to control and record the pressure of gas on the inlet and outlet of the retort-house governor, with two dead-beat pressure indicators as a stand-by. The waste-heat boiler is provided, in addition to the usual boiler fittings, with an automatic feed-water regulator and an alarm device. The feed-water pumps and the tar and liquor pump for the service of the foul gas mains are driven by steam.

The auxiliary plant comprises a new exhauster of 30,000 c.ft. hourly capacity, by the Bryan Donkin Company. The exhauster from the other site, of 15,000 c.ft. hourly capacity, is also to be transferred to the new building. Condensers are by Messrs. R. & J. Dempster; washer-scrubber by Messrs. Kirkham, Hulett, & Chandler; and Livesey washer and cyclone tar extractor by Messrs. W. C. Holmes & Co.—all of 750,000 c.ft. daily capacity. The mains throughout the works are 15 in. diameter, and were supplied by the Staveley Coal & Iron Company. The sidings were laid by Messrs. R. White & Sons, of Widnes. The works are provided with a road weighing machine for 20 tons load, and a railway machine for 30 tons load. The purifiers, consisting of four boxes each 20 ft. square, together with works station meter, had already been erected on this site in 1923.

The storage capacity consists of No. 1 holder, with two lifts, of a capacity of 80,000 c.ft., erected in 1890; No. 2 holder, with three lifts, and a capacity of 200,000 c.ft., erected in 1898; and a spirally-guided holder, with two lifts, and 400,000 c.ft. capacity, erected in 1920.

SCIENCE AS A CAREER.

Replying to the toast of "Our Guests" at the annual dinner of the Imperial College of Science and Technology, Sir Alfred Mond, Bart, M.P., remarked that, while they were getting research in the country at last, he was extremely dissatisfied with the progress it was making. Funds were not being provided on the scale they should be. Unless that were done, and people thought more of the importance of the subject of research, we should fall still farther behind our rivals in other parts of the world. He went on to say that he was Chairman of the Fuel and Power Committee, a member of which was Prof. W. A. Bone, Professor of the Department of Chemical Technology, and had had some opportunity of judging what was being done in Germany in regard to the fuel problem. When he contrasted the organization there with what was to be found here, he really felt quite alarmed and discouraged. While we thought in thousands of pounds, they thought in hundreds of thousands. One firm in Germany had spent well over £1,000,000 on their experimental work in oil and coal. There was a definite shortage of scientific men in this country; and this was hindering research work.

In his own Company, the number of men of the kind they wanted was far below the number they could absorb, and they had decided to approach headmasters with a view to selecting bright boys when still at school. Those boys would be assured that if they would go through a university and obtain first-class degrees, they would not have to look for a job, but would be found one in his organization, with remunerative salaries, at the moment they were ready to come. The Company hoped in this way to do something from the beginning to make science a career, just as the Bar or Medicine was now. They needed a much greater co-ordination between the leaders of science in the universities and those who required the taught material. They wanted a conference at an early date, so that those who were teaching could be told the directions in which their pupils would find work.

Two Lectures on "Flame."—Prof. Arthur Smithells, C.M.G., D.Sc., F.R.S., Director, Salter's Institute of Industrial Chemistry, will give at the Royal Society of Arts two lectures for children on "Flame," at 3 p.m. on Wednesday, Jan. 4 and 11. The lectures will be fully illustrated by experiments. Special tickets are required for these lectures, which will be issued to Fellows in the order in which applications are received.

Control of Water Softening Plant.—A meeting of the London Section of the Society of Chemical Industry was held at Burlington House on Monday, Dec. 5—Mr. W. J. A. Butterfield, M.A., in the chair—at which a paper was presented by Dr. H. S. Hatfield on "The Automatic Analysis of Liquids and Its Applications to the Control of Water Softening Plants." Apparatus was described by which measured samples of the water or other liquid are drawn, and reagent added to them until the desired change—such as from alkalinity to neutrality—is effected. Thereupon the proportion of reagent used is automatically shown on a chart, in terms of alkalinity or other property of the liquid from which the sample was drawn. The chart record consequently shows the changes from time to time in the degree of hardness, alkalinity, or the like, of the water, works product, or effluent which is under test; and control may thus be readily maintained of the softening or other treatment to which it is being subjected. A further development of the mechanism makes the apparatus itself control, according to its indications, the valve by which the works reagent—such as the softening chemical—is delivered to the bulk of the liquid, and thereby affords complete automatic regulation of the process.

NOTES ON HORIZONTAL SETTINGS: WITH SPECIAL REFERENCE TO SILICA RETORTS.

APPENDIX: CHEMICAL ASPECTS OF FAILURES WITH SILICA.

By A. EDWARDS

[Mr. Stephen Hay's paper appeared in our issues for Nov. 23 and 30.]

For the erection of silica installations, various jointing materials have been submitted by the different makers The composition varied enormously, for its vital importance was not generally appreciated. As an illustration, the analysis of cements submitted in 1924, 1925, and 1926 are given, and for comparison, a cement of American origin, also one from Germany used in the silica walls of coke ovens, and the standard cement used in the erection of a prominent system of continuous vertical retorts.

—	A.	B.	C.	American.	D.	German.	E.	F.	Verticals.
SiO_2	75·49	81·17	88·34	89·93	96·53	90·23	80·00	84·10	88·76
Al_2O_3	19·39	13·99	7·07	4·95	1·33	3·77	8·09	10·50	5·93
Fe_2O_3	2·40	1·92	1·50	3·83	0·94	1·23	3·15	3·12	1·10
CaO	2·09	2·09	1·48	1·90	0·35	3·10	..	1·76	0·53
MgO	0·24	0·24	..	..	0·42	..	1·03	0·19	1·51
K_2O	..	..	0·56	..	..	..	..	0·13	0·18
Na_2O	..	..	0·39	1·08	..	1·32	..	0·17	..
TiO_2	0·28	0·38	0·18	0·12	0·10	0·12	0·25	0·37	0·26
SO_3	..	..	..	..	..	..	..	0·24	0·68

Attempts to secure a plastic product that could be easily worked accounted no doubt for the presence of so much clay in the majority of the specimens. In order to crystallize the real essence of the situation, we would point out that from a purely refractory point of view the cement should have the same composition as the sections and bricks. To dilute it with fireclay is to reduce its load-bearing refractoriness.

As the temperatures of the combustion chambers were increased towards 1400° C., trouble was experienced with the development of holes which proved very difficult to stop permanently. The patching material used generally consisted of the makers' cement used alone or after the addition of 50 p.ct. of ground silica bricks, and its composition would approximate to C. A considerable amount of F mixed with an equal weight of ground silica bricks has been used.

Similar failures were reported by H. V. Corfield privately before the members of this Association, when one of the Beckton staff gave our experiences during the discussion. The data were critically examined by Dale, and a report upon the situation embodied in the Report of the Refractory Materials Joint Committee presented to the Institution of Gas Engineers. In view of the importance of the subject, we make no apologies for repeating the salient facts.

The holes are always in the combustion chamber side of the retorts. They occur only in the floor tiles, at the joints; never in the centre of a section or in the crown. The surfaces of the holes and the immediate surroundings are heavily stained red, dark chocolate, or blue black. When repairs or resetting become due, the damage revealed in the immediate vicinity of the hole is startling. The retorts immediately below the hole appear eroded, as if by the action of a strong solution. The action is local and confined to the area reached by falling débris. Portions of the adjacent division walls immediately above the nostrils are corroded in a manner which suggests the actual splashing of corrosive liquid from near-by retorts and horizontal surfaces. The ghastly appearance is illustrated in fig. 3, where one-half of the setting along its long axis was removed carefully so that the combustion chamber face of the remaining tier of retorts could be freely examined. That the local damage is a feature following the appearance of the hole is evident from the excellent state of the surfaces of the surrounding retort sections, upon which the maker's marks appear with all their original clearness. For the most part, these sections and the cross-walls retain their original surface colour, very slightly deepened, if at all, except in the vicinity of cracks or joints, where they are more or less heavily stained. Stains can be traced spreading from joints nominally covered by the cross-walls, where, by movement or bad workmanship, the cement-section interface has parted, allowing the passage of coal gas. We can say definitely that this condition is universal; the virgin appearance of the sections in fig. 6 is the usual appearance of silica work in contact with furnace gas made in inside producers, and it is only marred at the local isolated points where gas has issued into the setting.

There is little doubt that the frightful appearance of the surfaces below the hole is due directly to efforts to stop it with material unsuitable for the work. The temptation is to make up a cement in which plasticity is a prime factor. Too little attention has been paid to the refractory nature of such filling; and whatever good there was in the original basal material has been profoundly modified by the determination to secure plasticity, in the belief that it is essential. Clay, therefore, has been considered an essential constituent, and necessary to secure plasticity. Many of the proprietary brands under fancy names contain as much as 6 p.ct. of sodium silicate (water glass) in addition to clay; and their refractory nature is negligible. In most of the cements examined, clay is in sufficient quantity to confer its own characteristics upon its admixture with quartzite. At the temperature attained by the section, and under the influence proceeding from the interior of the retort, such cement has become sufficiently fluid to flow, thus failing in its initial purpose and causing additional damage to the surfaces below.

From time to time, as the use of silica extended, slagged portions of material from the retort sections which had holed, and from various other parts of the settings, have been submitted for analysis. Without exception, the examples from the sections have been deeply tinted from chocolate to blue-black, and have contained a very high proportion of the oxides of iron and alumina. The iron has always been accompanied by more alumina than was present in the original material. No material in a badly slagged condition has been found containing the original silica base with an increment of iron oxides only.

Cement of the types "A" and "B" is not sufficiently refractory to withstand temperatures in excess of 1300° C., and fails for purely thermal reasons in both the cross-walls and the retort sections. Cement containing 90 to 91 p.ct. of silica remains in the cross-wall joints, but has not stopped the holing of retorts. Preferential attack is clearly indicated from the retort side of the joint in this case. Though the cement had remained in the cross-wall joints, there is evidence that it is not in a satisfactory condition to function in retort joints. A portion which appeared to be undisturbed after service since 1922 was examined this season. The composition is given:

SiO_2	91·00
Al_2O_3	4·35
Fe_2O_3	1·48
CaO	2·66
MgO	0·47
Alkalis	trace
TiO_2	*Nil.*
SO_3	*Nil*

The total lime, magnesia, and oxide of iron is somewhat high, but in 1922 it would be regarded as a remarkably satisfactory cement solely on its content of silica. The crushed material was gauged with a weak solution of gelatine and pressed in a cylindrical metal mould used for the thermal examination of refractory cements (1 in. diameter, ¾ in. deep), and the resulting cylinder heated under a small load—about 1 lb. per sq. in. Consolidation occurred at 1200° C., and was so rapid at 1230° C. that the heating was discontinued. The diameter of the cylinder had then decreased by 7 p.ct., and the height by 17·5 p.ct. Obviously consolidation can only occur by the fluxing of the fusible constituents and the drawing together of the infusible portions by the resulting wetting. The quantity of fluid or semi-fluid matter, though sufficient to pack the particles of silica together, was insufficient to cause marked distortion or total collapse. Such a condition is, however, undesirable, for there is a state of potential collapse awaiting the application of the critical pressure to make it active; and in addition the films of molten matter are in a state suitable for ready chemical combination with extraneous inorganic matter. We mention this case partly because the refractoriness appears to be very low for the chemical composition. Whether the lowness is due to some peculiarity in the physical structure or to the distribution of the fluxing agents, both possibly aided by the maturing action at combustion chamber temperatures, we are unable to say. It is obvious that the original cement applied in the wet way underwent a similar shrinkage in both the cross-walls and the retort joints; a shrinkage of almost one in five cannot be regarded as satisfactory, and must inevitably leave gaps in those joints not subject to a closing pressure.

The feature about the whole of the slagged materials examined is the extraordinary amount of iron oxides and compounds, much of which is in the ferrous state. These oxides were certainly not present in the original materials, and could only be derived from the coal, or from the coke via the furnace gases. We have already discounted the attack of dust in furnace gas upon purely silica material—our experience is conclusive—but there remains the possible action upon clay admixed with the silica of the jointing material, particularly in view of the condition of the siliceous segments in fig. 5. This

is effectively answered by the condition of the jointing material in the cross-walls remote from the retorts, which suffer only a surface attack. If iron is in sufficient quantity and in a suitable state, it will inevitably penetrate the porous silica, and some evidence of its presence should be found in the silica itself or in the jointing material. We have chosen an example for analysis which, in addition to answering this point, has another interesting feature. Usually the material of the cross-walls retains its cream to light buff colour, but occasionally a white zone appears adjacent to the joint. A brick so changed which exhibited a $\frac{3}{8}$ in. bleached zone followed by a $\frac{1}{4}$ in. red zone and the usual buff core, was examined, together with a small portion of the attached cement.

Brick from Cross Wall Combustion Chamber.

—	White Zone.	Red Zone.	Buff Zone.	Cement.
SiO_2	94·31	93·68	94·03	78·70
Al_2O_3	2·74	2·17	2·17	18·63
Fe_2O_3	0·38	1·94	1·62	1·31
FeO	0·42	0·28	0·14	0·42
CaO	2·07	2·30	2·17	1·34
MgO	0·02	..	0·03	*Nil*
Na_2O	0·08	Trace	Trace	0·08
TiO_2	0·06	0·04	0·14	0·07
SO_3	0·03	0·03	0·02	0 04

The bleached effect, which we had originally thought might be due to excess lime present by mistake in the cement, was actually due to the removal of iron oxide from that zone, the substitution of the ferrous for the ferric state, and the concentration of the iron in the adjoining red layer. The colour effects bear out the conclusions from the analyses; for the redness of that zone is no doubt due to the deposition of the iron on the surfaces of the grains which would enhance the visual effect. The removal of the iron from the grain surfaces of the white zone would suppress the warm colour. The quantity of iron oxides in the cement is not excessive for the type. An interesting feature is the almost complete disappearance of the alkalis; and our experience points to this being usual at the temperatures and with the type of unwashed coal used.

As a contrast to this specimen, cement taken from the joint between the retort sections and the cross-wall covering the end joints of the sections contains an appreciable amount of iron, which we suggest is due to gas leakage at this point.

SiO_2	78 58
Al_2O_3	8·46
Fe_2O_3	4·18
FeO	1·08
CaO	5·26
MgO	..
Alkalis	..
TiO_2	0·45
SO_3	1·61

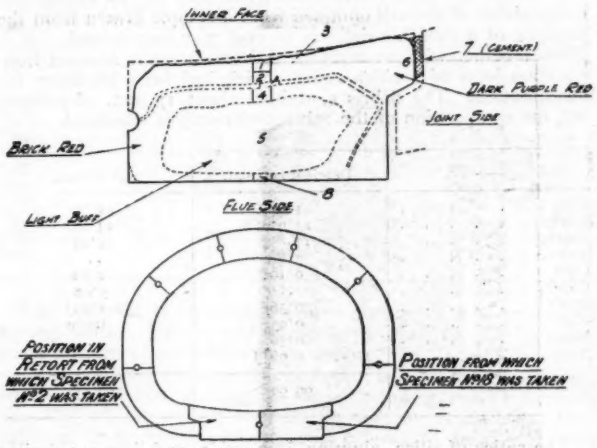
In view of all the circumstances, we came to the conclusion that iron in a gaseous form was compounding our troubles, that it was produced in the retort, and that it had most effect in the presence of clay, or of silicates of which aluminium silicate constitutes the bulk. It was but a step to couple the presence of salt and iron in the coal with the readily volatile ferrous or ferric chloride, to have the skeleton of a possible explanation.

Gas engineers will be familiar with the presence of chlorides in the coal, for about 15 to 25 p.ct. of the ammonia in the liquor is combined as chloride, which has undoubtedly passed from the coal as gaseous ammonia and hydrochloric acid; but the temperature at which hydrochloric acid appears in the heating of coal may not be so familiar. In "The Spontaneous Combustion of Coal," by Stopes and Wheeler, Bulletin No. 1 of "Fuel," appears the following surprising extract concerning the heating of vitrain and durain:

> The distillates obtained between 150° and 300° C. were aqueous, with traces of hydrocarbon oils. They fumed strongly in air, and were found to be concentrated solutions of hydrochloric acid.
>
> The aqueous portions separating from the distillates between 300° and 500° C. were also strongly acid (hydrochloric acid).

Hydrochloric acid, therefore, may be present at any point of the cross-section of the charge, and its concentration due to condensation and re-evaporation may increase towards the mouthpiece. The iron silicates or sulphides or carbonates—or whatever form the iron takes in the ash—are open to attack, with the formation of chlorides which subsequently become volatile as the temperature increases. If it should be deemed necessary, we have the presence of metallic iron at the higher temperatures, with which acid may directly unite. All coke when freshly made contains metallic iron reduced from the state of combination by the coal gas. Its presence is manifest by a prolific development of red rust spots in washed small coke that has been recovered and stored some time.

As the iron compounds wander into the surrounding refractory surfaces which are at high temperatures, there is the possibility of interaction with any silicates that may be present, with consequent concentration of iron compounds (silicates) of lower vapour pressure at that spot. We regard all silicates, from whatever source they are derived, in contradistinction to silica, as points of potential danger, because of their lower intrinsic fusibility compared with silica, and the possibility of the formation of still more fusible iron silicates. Silicates in silica material should be the minimum necessary to secure bonding and conversion. Experience proves that the proportion in popular brands is insufficient to initiate collapse at temperatures below 1420° C. Increasing proportions of silicates in the jointing cement definitely weaken it. Cracks in the retort sections, or the partial opening of joints by movement of the surrounding brickwork leaving cavities, can trap coke débris, the carbon of which is consumed, leaving the ash behind with its content of silicates. We regard this as a very potent source of failure.



Specimen No. 18.

However carefully silicates may be excluded from the jointing cement, it will only postpone trouble should the construction allow movement of the sections and the opening of the joints; particularly so when the lower joints in the danger zone are those likely to feel the effects most. It is for this reason that allowances for possible after-expansion, which may or may not take place evenly, are a source of danger. As mentioned elsewhere, the minimum possible thickness of jointing material should be used, and the whole designed and bound together to the semblance of a monolithic block.

Examples of the effects of slag attack secured before complete perforation had taken place (similar to the sections exhibited) were critically examined in the laboratory. Specimen No. 18 is a silica tile from the bottom of a second-tier retort on the combustion chamber side. Portions from the parts numbered were taken for analysis.

No. 1 was taken from the face in contact with the coal, and represents the average composition for a depth of 8 mm.

No. 2 was taken from the layer adjoining No. 1, and represents the average composition of the lower half of the dark outer zone to a depth of 15 mm.

No. 3 was taken as closely as possible from the area comprising the narrow yellow band 2 mm. wide at an average depth of 17 mm. from the surface.

No. 4 represents the brick red portion of the section below the yellow band approximately 25 mm. from the surface.

No. 5 was taken from the apparently unchanged centre of the tile 40 mm. from the surface.

No. 6 represents the end of the joint tongue where the material was honeycombed by fusion.

No. 7 is the small portion of cement which adjoined No. 6.

No. 8 was taken from the light buff tinted face of the tile that had been in contact with the furnace gas, and represents the average composition for a depth of 5 mm.

All parts of the tile were intact, and not fused so definitely as to become distorted by flow, except the area at the end of the tongue marked No. 6, which was honeycombed.

Analysis of Specimen No. 18.

—	1.	2.	3.	4.	5.	6.	7.	8.
SiO_2	84 93	86·55	89·78	94·19	95·63	82 28	84·26	95·67
Al_2O_3	2·34	1·98	4·02	1·05	1·40	5·53	6·50	1·04
Fe_2O_3	7·45	4·35	1·65	1·34	0·07	2·47	3·97	0·93
FeO	0·93	0·77	..	0·29	0·50	2 78	1·39	0·18
FeS	2·01	2·53	1·36	..	..	3·41	0·83	..
Fe	0·24	0·22	0·11	..	..	0·57	0·11	..
CaO	1·84	3·14	2 31	1·84	1·34	3·11	3·03	1·62
$CaSO_4$	..	..	0·81	2 04	1·27	..	..	1·24
MgO	0·11	..	0·03	0·03	0·03	0 08	0·45	0·10
K_2O	..	..	..	..	..	..	..	..
Na_2O	..	..	..	..	..	..	..	..
TiO_2	0·03	..	..	..	..	0·15	0·02	..

The compositions at the opposite faces differ materially. No. 8 adjoining the combustion chamber varies but little from No. 5 at the centre of the section; the iron is slightly higher but moderate in amount, and is mainly in the ferric state, compared with the ferrous state of No. 5, which would account for the slightly deeper colouring. Nos. 1 and 2, in contact with the coal and coal gas, are heavily loaded with iron compounds, a considerable proportion of which appear as sulphide. The differential tinting of the narrow zone No. 3 is apparently due to a stratum of the material differing in composition from the rest of the section, for the alumina is definitely high. Chemical reduction has been strong enough to produce metallic iron, at its maximum in No. 6, as also is the ferrous sulphide. The alkalis are present in traces only.

To satisfy ourselves that the iron additions of Nos. 1, 2, and 6 were not due to the incorporation of coal ash *en masse*, the composition of the ash obtained from a sample drawn from the average of a month's delivery of coal was ascertained. It is given together with an analysis of débris actually scooped from an open joint of a silica retort which had been let down for examination. The débris contained about 17 p.ct. of carbon; but the composition of the ash content only is tabulated.

—	Débris from Joint.	Ash of Coal.
SiO_2	44·70	41·76
Al_2O_3	25·97	24·75
Fe_2O_3	17·85	24·43
FeS	3·68	..
CaO	6·10	2·62
$CaSO_4$	..	5·08
MgO	0·36	1·01
K_2O	0·05	trace
Na_2O	0·36	,,
TiO_2	0·92	0·90
	99·99	100·55

The ratios of silica, alumina, iron oxide, and lime are similar in each analysis. The sulphur, appearing as calcium sulphate in the ashing of coal, partly appears as sulphide under the reducing conditions in the retort; and all of it has been arbitrarily calculated as simple ferrous sulphide in both this and other analyses. No attempt has been made to trace the way it is distributed in combination.

It is evident from the ratio $\frac{Al_2O_3}{Fe_2O_3}$ in the ash and in the silica section that the iron has preferentially accumulated in the latter.

A second section from a similar position examined in the same way points to the same conclusions. The inner surface was pitted somewhat all over, but only at "B" was it badly slagged. Judging by the contour of the stained area, the attack had originated at "B" and penetrated diagonally through the section.

No. 1 portion represents the composition of a layer 9 mm. thick from the inner face in contact with the coal.

No. 2 is from the next layer adjacent to No. 1 between the depths of 10 and 25 mm.

No. 3 is representative of a layer 7 mm. deep from the surface adjoining the combustion chamber. It had retained the original appearance of the material.

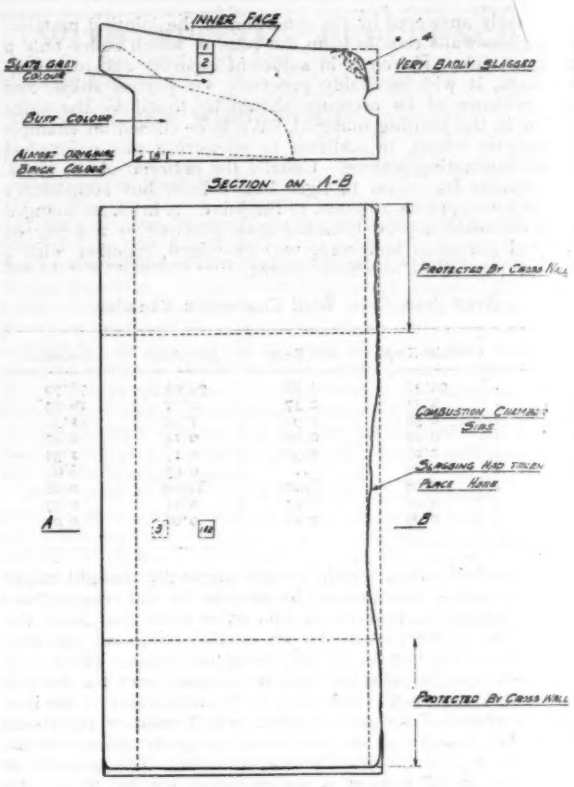
No. 4 is from the centre of the very badly slagged area at the joint.

The concentration of iron compounds is enormous in Nos. 1, 2, and 4; the outer surface No. 3 in contact with the producer gas contains but a fraction of the amount. In spite of the heavy load of extraneous matter, the section at Nos. 1 and 2 layers is not distorted. Apparently the iron compounds occupy the pore spaces without breaking the bond of grain with grain at the temperature found inside the retort.

The iron attack is necessarily at its most destructive stage in the vicinity of masses of iron or concentrations of iron compounds, and is thus confined to the surfaces of the retort in actual contact with the coal. It is influenced in destructiveness by the presence of silicates; and these are found in the jointing cement and in the débris accumulating in hollows or cracks, which, taken together, indicate the greatest attack at the floor

Specimen No. 2.

—	1.	2.	3.	4.
SiO_2	75·76	80·49	92·11	80·96
Al_2O_3	2·87	1·60	1·80	6·86
Fe_2O_3	6·46	6·60	3·01	2·31
FeO	8·99	2·31	0·43	6·07
FeS	3·44	6·52	..	1·40
Fe	0·12	0·11	..	0·16
CaO	1·97	1·77	2·25	2·03
$CaSO_4$	..	..	0·42	..
MgO	..	0·05	0·27	..
K_2O	0·25	..	0·30	0·59
Na_2O	0·22	..	..	..
TiO_2	0·10	0·09	0·08	0·14



Specimen No. 2.

joints. Its extent is a function of temperature, which points to the greatest action at those floor joints subject to the maximum combustion chamber temperatures, as in fact we have actually observed.

The greater proportion of the volatile iron compounds must be swept forward in the currents of coal gas, and at such dilution that absorption by the silica has not been detected. To illustrate this point, two portions of retort from the same ring of segments were secured. The analysis marked "G" is from the inner face of the floor tile in the danger zone, and that marked "H" is from the inner surface of a crown tile diagonally opposite.

—	G. Combustion Chamber Side Contact with Coal.	H. Waste Gas Side Contact with Coal Gas.
SiO_2	84·19	96·38
Al_2O_3	3·66	1·47
Fe	0·94	..
FeO	1·46	0·35
FeS	3·20	0·16
Fe_2O_3	1·61	0·03
CaO	4·07	2·02
MgO	0·18	0·09
K_2O	0·11	trace
Na_2O	0·28	,,
TiO_2	0·30	0·05

The analysis of the crown tile is practically normal, with the exception that the iron is wholly in the ferrous state and is partly sulphided. The floor tile has accumulated approximately 13 p.ct. of adventitious matter, in which iron bulks largely.

The indication of the deleterious effects of alumina present in the combined state was acted upon at an early stage in our efforts to combat the nuisance of joint failure. In the preparation of silica cement from ground quartzite rock, we asked that the added clay should not be more than 5 p.ct., and this only as a sop to plasticity; and to assist the latter further, that the rock should be milled very fine. As usual in the manufacture of silica materials, the addition of 2 p.ct. of lime afforded a high-temperature bond. Such a composition might be a little better than the one quoted earlier containing 91 p.ct. of silica and 4·35 p.ct. of alumina, which consolidated abnormally at 1230° C.

It is obvious that the intrinsic point of subsidence of any cement should be high enough to afford a range through which it might be lowered by contamination with volatile iron compounds without suffering collapse. The inner face of the joint will approximate to a temperature of 1180° C., and the outer face may reach 1420° C., when working to an average of 1380° C. in the combustion chamber. There are few clays which do not begin to collapse at 1250° C. under load. The

most refractory cannot be trusted to withstand a constant 1350° C. without shrinking and distorting. Should the inner face of a joint shrink and allow penetration of the gases to the lower portion of the joint at or about 1400° C., the presence of only 5 p.ct. clay, small as it seems, would render the cement unstable.

The test of service is the final arbiter in the choice of a suitable jointing cement; but a prior selection must be made. For this purpose, the cements are cast in a small cylindrical metal mould 1 in. in diameter and ¾ in. high, removed while still damp, allowed to air dry, and measured. The cylinders are then dried at 100° C., cooled, and re-measured. In order to give them an initial bond before they are called upon to bear any weight, they are placed in a cold muffle and slowly raised to a temperature of 1000° C., held there for two hours, slowly cooled, and re-measured. Most cements are sufficiently hard to bear handling after this maturing treatment. For the final firing in a small surface-combustion furnace, they are placed under the load of a stop-ended alundum tube which projects above the furnace and serves to indicate by its position with regard to a reference mark any change in height. The upper surface of the cylinder may be observed directly with an optical pyrometer through a small aperture in the end of the tube which rests upon it. At the termination of the heating period, the cylinder is again measured.

A cement which we judged to contain not more than our prescribed 5 p.ct. of clay—say, 2 p.ct. of Al_2O_3 from the addition, and 1 p.ct. naturally in the quartzite rock—has been used to a considerable extent this year. The complete analysis is given:

Test Cylinder 43.

SiO_2	94·50
Al_2O_3	3·10
Fe_2O_3	0·99
CaO	0·55
MgO	trace
Alkalis	,,
TiO_2	0·37

In the refractory test, the first sign of subsidence was apparent at 1400° C., and was rapid between 1420° and 1450° C., when the heating was terminated. When measured cold, the cylinder had shrunk to the extent of 12 p.ct. We are not altogether happy about its final life. If the inner portions of the joint remain surface to surface with the adjoining silica sections, it may be useful. Should the surfaces part and allow the gases access to the lower and hotter combustion chamber end, it is not sufficiently refractory to withstand the lowering effect of the iron penetration, and it will fail while the sections have still a useful life.

The analysis of another cement a shade better in alumina is given:

Cylinder 47.

SiO_2	94·47
Al_2O_3	1·90
Fe_2O_3	0·24
FeO	0·59
CaO	2·16
MgO	0·38
Alkalis	traces
TiO_2	0·06

In the refractory test the first sign of subsidence commenced about 1480° C., but did not develop; after 1530° C. the final cold measurement disclosed an expansion compared with the mould size. The refractoriness is not unduly lowered, and there appears to be a sufficient margin for contamination without failure.

Nos. 43 and 47 have been deliberately chosen, as they illustrate another point. The silica content in each is the same; the main difference being the substitution of lime for alumina. The gain in refractoriness is definite, and points to the greater effect of combined alumina in lowering the intrinsic refractoriness of the quartzite base. We are assured, by one who has had much experience, that this is usual, and that we need have no hesitation in going up to 4 p.ct. of lime. The difference between the two does, however, appear to be very large for the somewhat trifling difference in composition; and we have a suspicion that part of the difference may be due to a physical dissimilarity. No. 43, examined under the microscope, has slightly more rounded grains than 47, in which splinters and angular particles are in greater proportion. The latter will, of course, pack better and resist displacement better than the former. A sure indication of this is in the porosity of shapes produced from the material. The porosity of No. 43 is 37 p.ct., compared with 33 p.ct. of No. 47, as they leave the makers' kilns.

One of the silica brick manufacturers approached the question of suitable jointing cement seriously after a somewhat mixed experience of gas-works requirements. After listening to our gospel of alumina exclusion, we were startled to hear that he proposed to market a quartzite cement containing no clay additions whatever, and yet make it plastic. The lack of clay was to be made good by an organic glue. To us the proposal was revolutionary, for it gave us the same refractoriness and composition in the cement as in the silica section. We have since found that the proposal is not entirely novel. At least one of the large Continental erectors of coke ovens is using identical means for the jointing of the silica oven walls with cement high in silica; and others use it to bond the material in the making of bricks and shapes. Recently another manufacturer spoke of it, and has supplied us in bulk.

This type of cement is by far the most refractory, and fires in a perfectly satisfactory way to a homogeneous hard mass, retaining its original shape throughout. No consolidation occurs, but there is an expansion to 1550° C. amounting to 2 to 3½ p.ct.—depending no doubt upon the proportion of fired material (in the shape of fractured bricks) incorporated with the unfired quartzite. Five analyses are given. In each case the material has behaved in a perfectly satisfactory way in the laboratory tests. The mass is finely ground, consisting of angular particles in generous proportions. Finished bricks of this material have a porosity of from 27 to 28 p.ct.

	—				Cylinder 24
SiO_2	95·28	95·42	94·35	95·45	95·97
Al_2O_3	1·12	1·17	1·28	1·26	0·49
Fe_2O_3	0·72	0·63	0·74	0·67	0·45
FeO	0·26	0·37	0·47	0·44	0·74
CaO	1·79	1·69	1·63	1·65	1·97
MgO	0·26	..	..	trace	trace
K_2O	..	0·24	0·32	0·11	0·37
Na_2O	..		0·20	0·11	0·10
TiO_2	0·25	0·21	0·33	0·29	0·23
SO_3	0·18	0·26	0·16	0·13	..

The material is incorporated in a portion of this year's resetting work. By the end of 1928, we shall be able to give some account of its behaviour in service.

While we have from a refractory point of view secured cement which should last as long as the sections, it cannot be said that the bricklayers are very enthusiastic about its use. The material is undeniably short, and refuses to behave in the unctuous way of a straight fireclay. Whether further modification of the organic content can improve matters, we are unable to say. There is not so much trouble with straight brickwork as with shapes such as the crown tiles of the retorts. Whatever may be the difficulties attending its application, we feel sure that it should receive the fullest trial, for the gain in upkeep and the conservation of therms in an extended life will more than compensate for the possible slowing-up of the resetting work.

Some of you may have doubts about the setting properties of such cement, and may expect it to crumble at any but the highest temperatures. It sets cold to quite a respectable hardness, and darkens in colour due to the glue. We have for your inspection a cylinder of the material marked 24—chosen because the alumina was the lowest of the series, and for that reason might be suspected to be short at all points—which has been fired to 1000° C. only. You will note that at this low temperature there is a satisfactory coherence. At 1550° C., as you may see by the duplicate, the material is hard like stone.

In view of the uncertainty attached to the use of cement with anything greater than a meagre 1½ p.ct. of alumina at combustion chamber temperatures of 1400° C., one might ask if there are any prospects of another way round in the quest of therms which will not make such a call upon the quality of the material. We feel that there is much to be said for the reversible system of heating generally applied to coke ovens, as already mentioned. Instead of the graduation of temperature from 1400° 2 ft. above the nostrils to (say) 1250° at the crown of the arch, and 1000° at the bottom retort immediately before entering the regenerator, which represents the facts today, we could maintain the same average temperature inside the retort if the heating was conducted alternately from one side and the other at a temperature in the combustion spaces of not more than 1250° C. There would be an enormous gain in the lower wear and tear of the setting, and the composition of the cement would not require such painful scrutiny. We are satisfied that at the temperature mentioned there would be no loss of therms by the adoption of such a system.

The holing trouble arises about the hot spots of the combustion chamber; and if the temperatures there could be reduced below 1320° to 1330° C.—a critical point partly based upon the known stability of most clay substances, but liable to wander according to the idiosyncrasy of the particular brand—most of the trouble would cease. The point would allow fairly comfortable working at (say) 1300° C., which, if uniformly attained by a reversible system, might yield another three therms of gas above that possible at 1400° C. in the present type of settings. This manner of tackling the problem is more rational than the quest of special refractories or the shielding of the silica at the danger zones. Some good would arise from the admission of air in more than one stage, but not to the extent possible with a reversible system.

We had the benefit recently of inspecting many coke oven plants on the Continent; and inquiries failed to disclose trouble of the character we have been describing. Jointing cement of

the type marked "German 1925" is used with success. With the reversible system of heating, the outside oven wall temperatures do not attain those of our hottest spots, and are usually very much below 1330° C. It is also apparent that a vertical wall offers little scope for the accumulation of débris.

The intensity of the attack may differ with refractories of varying physical characteristics. We believe that very porous materials should be avoided. The higher the porosity, the greater is the effect of volatile iron attack and slag penetration. Strength and hardness are also dependent upon porosity. The extent of porosity is some indication of the kind of structure determined by the constituent grains during manufacture, and it is possible to derive therefrom some useful indications of the general characteristics of the product. Our English brands vary in porosity from 27 to 39 p.ct.; we have gone to the Ruhr for material of 22 p.ct. porosity. Not all quartzites are capable of giving finished products of such low porosity. Many of our brands consist of rounded grains which can be rubbed apart readily. Under the microscope they have the appearance of separate and distinct rounded entities of diameters ranging from 0·15 to 0·4 mm., with few smaller particles. They contain few solidly massed areas.

Such material is of the sandy order. If we calculate the proportion of pores which would result if each separate rounded grain could be packed in the minimum space, the proportion is 27 p.ct. If we made an experiment by actually filling a space, and consolidated the grains by tapping, with the object of approaching this ideal state of packing, the resultant porosity would be about 33 p.ct., which is the practical minimum of such haphazard packing. It is significant that materials in which the separate rounded grains can be seen placed side by side have a porosity about 37 to 39 p.ct. They cannot be produced with a lower porosity than 33 p.ct.—that of the closest haphazard packing. Improvement, therefore, towards the attainment of lower porosities, and consequently strength, is not possible with these materials. They cannot possess any great strength, for there is but point contact of grain with grain. Blending with more angular particles is essential. With the presence of sharp angular particles and splinters, there is the possibility of closer packing, for flat surfaces come together. The adherence is infinitely more powerful than is possible with rounded grains, and it will withstand higher temperatures or greater slagging influences before it is overcome. Our best brands of mixed grains reach a porosity of 27 p.ct. The attainment of still lower porosity appears to be a matter of grading and the selection of quartzite rock which does not suffer greatly by disintegration to discrete particles when conversion of the quartz takes place. The inclusion of such solid masses of material size, with the smaller grains nicely proportioned to fill the voids, is necessary to secure the lower porosities which we feel sure will give more lasting service than the bulk of the materials we have used in the past.

AMERICAN GAS ASSOCIATION.

NOTES FROM REPORTS AND PAPERS.—SECOND ARTICLE.

CARBONIZATION COMMITTEE.

Again the Carbonization Committee, with Mr. R. G. Porter as General Chairman, present a lengthy report, covering much work done. It is divided into three parts—the Operators' Section, the Low-Temperature and Complete Gasification of Coal Section, and the Builders' Section. The Sub-Committee on Producer Gas include a paper on the subject of "Coke-Fired Gas Producer Operation," which deals largely with the control of blast in a gas producer to give a uniform ash bed, reduce carbon loss in ash, and deliver the best gas possible.

CONTROL OF CALORIFIC VALUE.

A Sub-Committee was organized to study the present practice throughout the country in regard to controlling the calorific value of the coal gas sent out. When the illuminating power standard was first replaced by the standard of calorific value, the requirements were made so near the heating value of coal gas as normally produced—say, 600 B.Th.U., with 550 B.Th.U. as a minimum—that the task was to keep the value high enough, rather than to devise a means of lowering the calorific power of the gas sent out. To-day, however, heating value requirements have, generally speaking, been reduced to a level which has rendered it necessary to adopt some plan of maintaining the gas uniformly at a lower figure than its normal value. In order to ascertain what is being done in this connection, several questions were put to operators of coal gas plants throughout the country.

Twenty works intimated that they are using producer gas for B.Th.U. control—twelve of them coke oven plants, and eight retort plants. In one case, straight coke oven gas is being diluted with sufficient producer gas to bring the calorific value down to about 550 to 555 B.Th.U.; and the resultant mixture is passed through a light-oil scrubber, which further reduces the figure to 537 B.Th.U. Another reply states that coal gas of from 570 to 590 B.Th.U. is diluted directly in the hydraulic main with producer gas which varies between 130 and 140 B.Th.U. This producer gas is made from pea-size coke. As to why this means is adopted, a frequent answer is that producer gas is the only available diluent. The reason of one works for using it is that it is felt to be cheaper and better than steaming; while from another comes the statement: "We use producer gas for dilution because we believe it to be the most economical gas for this purpose, both in actual cost of production and ease of handling. We have considered using blue gas for dilution, but figures show this to be more expensive than producer gas."

In the group using either blue or carburetted water gas to control calorific value, sixteen plants are included, covering all types of operation—verticals, horizontals, coke ovens, and some plants which are purchasing coke oven gas from outside sources. The third group (six plants) comprises vertical ovens, which, in general, control the calorific value of the gas by means of steaming in the chambers.

The subject of inerts is bound up with the question of control; and as to this, the Sub-Committee remark that, within the B.Th.U. range operative to-day, inerts, specific gravity, &c., while important, are not the matters which govern the problem of B.Th.U. control. However, as calorific standards are brought lower, these factors loom larger, and become increasingly vital.

DRY QUENCHING.

Another Sub-Committee have been considering the dry quenching of coke, two installations for which have now been put into operation in the United States—the Sulzer process at Rochester, and a "U.G.I." plant at Syracuse.

As to the former, the conclusions are: (1) The dry quencher appears to be an economic success where the steam can be used—where credit for steam alone is taken. (2) There are a large number of intangible, yet real, credits difficult to value. (3) The dry quenching operation breaks-up the coke so that it averages a smaller size, and contains more breeze, than the wet quenched coke. (4) The fundamental structure of dry quenched coke does not appear to be any stronger than wet quenched coke. (5) Where it is necessary to crush the wet quenched coke to meet a market, the coke crushing operation is saved, and breeze production somewhat reduced, by dry quenching.

The "U.G.I." type of quencher requires no skip hoist, since it is constructed below ground level. The coke slides directly from the hot-coke car into the quencher, where it remains in a state of rest until quenched. It is then discharged at the lower end. The aim has been gentle handling of the coke, rather than maximum steam production; and there seems to be actually less breakage or degradation than with wet quenching under similar handling conditions. It apparently will produce at least 1 p.ct. more saleable coke than when wet quenching is employed.

An abstract is given of the paper on "Coke Cooling" read by Mr. John P. Leather at the last meeting of the Institution of Gas Engineers, as reproduced in the "JOURNAL" for June 22, 1927 (p. 913), which, with the ensuing discussion, those interested are recommended to read. Attention is also directed to the abridged translation of the paper presented by M. Pierre Mougin to the last annual French Gas Congress, which appeared in the "JOURNAL" for July 13 and 20, 1927 (pp. 95, 165).

Concluding their report, the Committee say: "The Sulzer system at Rochester is apparently yielding an average gross return of 20 to 25 p.ct. on the investment. This seems to be confirmed in the discussion of Mr. Leather's paper, where an installation to handle 25,000 tons of coke per annum was expected to yield a return of £4000 on an £18,000 investment. The above returns are figured on steam production only. The 'U.G.I.' system has a somewhat lower investment cost than the Sulzer system; and while it is too soon to say what the maximum return will be, it is expected to compare favourably with the other systems. It might be of interest to present an estimated balance-sheet based on the Rochester plant, attempting to evaluate some of the intangible benefits, on what might perhaps be called an over-optimistic basis, and yet one which seems not impossible to eventually realize. Some exception may be taken to the amount set-down for the increased value of the coke. It is granted that, even with the water necessary to lay the dust, we shall sell less tonnage of water than before. On the other hand, we are giving the customer a more combustible, more easily ignitible coke, with more pounds of combustible per ton, cleaner, better sized, and better looking. For

these real advantages can we not trust our selling departments to get a commensurate return? We shall with such coke have the further advantage of being able to retain our market in times of over-supply."

LOW-TEMPERATURE CARBONIZATION.

The Sub-Committee appointed to deal with this subject have found difficulty in securing definite reports of progress with American plant trials; but the various processes under trial or projected at the present time are indicated, with whatever detail has been obtainable concerning the progress of each. It is, they say, agreed among most students of the subject that the crux of the question of commercial success for low-temperature carbonization in the United States will lie in the coke—its relative value, its advantages (if any) over other cokes, and the demand that may be built-up for it. The matter of definition—how to characterize or differentiate cokes made at various temperatures or by different systems of heating—is a troublesome one; and agreement has not been reached upon it. It will be necessary to clarify one's ideas upon the grouping and designation of the various cokes that may come from the new processes of coal carbonization, and to determine whether they form a distinctly new class, and (if so) where is the dividing-line. When this has been done, the data to be obtained from working trials of the new cokes can be better interpreted and applied. For boiler firing, the question of the degree of benefit secured by pre-carbonization of the fuel has still to be determined. For water gas generation, or for the large field of domestic fuel, any enhanced value in these new cokes must be proved by careful test, and their saleability demonstrated. Only if a real enhanced value exists, in relation to the equivalent raw coal, can these processes succeed.

An account is included in the report of developments in England and Germany.

VALUE OF MICROTHERMAL STUDIES.

In the course of a contribution (published with the approval of the Director of the United States Bureau of Mines) describing recent scientific research in low-temperature carbonization, with particular reference to the mechanism of coking, Mr. Joseph D. Davis says that microthermal studies now being carried out by Stadnichenko and White seem destined to throw considerable light on the mechanism of carbonization. The experimental method adopted is novel. It consists in mounting a thin section of the material to be carbonized on the stage of a microscope provided with electrical means of heating, and observing the changes in the character of its distinguishable constituents through the microscope while fusion and carbonization are taking place. As will readily be appreciated, the working-out of manipulative details of the method has been fraught with great difficulty, and consequently progress has necessarily been slow. The work has progressed far enough, however, to indicate decided variations in the behaviour of different fossil constituents on heating. So far, the method has been applied mainly to oil shales; but there seems to be nothing to prevent its application to coals.

EFFECT OF CERTAIN COAL CONSTITUENTS ON COKE FORMATION.

So far, says Mr. Davis, the part played in coke formation by coal constituents extractable by benzene under pressure according to the method of Fischer, is not entirely clear. It cannot be questioned that the method is of considerable value in the investigation of coke formation; but other investigations have indicated that it cannot be applied in the strict sense that Fischer's interpretation indicates. Fischer has claimed that the portion of the benzene extract which is soluble in petroleum ether is mainly responsible for coke cementation, and the portion which is insoluble in petroleum ether is mainly responsible for swelling of the charge during coking. The work of Bone and others produced results somewhat at variance with those of Fischer, in that the portion of the benzene extract insoluble in petroleum ether rather than the soluble portion was found responsible for coke cementation. Results obtained recently by Davis and Reynolds are in accord with the work of Bone.

Such disagreement as to the specific influence of extractable constituents is to be expected, Mr. Davis thinks, because there is no assurance that the same rate of heating was followed by the three investigators in making the coking test. The work of Audibert, and also that of Burdelin, indicates that this is very important, particularly at the rapid heating rates prevailing in such laboratory tests as those used. All investigators agree that the benzene extract contains the coking principle; the residue is almost devoid of coking power. Mr. Davis believes it to be highly probable that all constituents extractable by benzene contribute to the coking power of coal, when the coking conditions most favourable to the exercise of that power by the constituent in question prevail.

Without knowing the heating conditions favouring the participation of the various constituents in coke agglutination, one cannot yet apply the results of such experimental work strictly to coking on a large scale. It should be mentioned that the solid bitumens insoluble in petroleum ether but extractable by benzene are likely to form the most viscous melt on softening of the coal by heat. A predominance of such material would be expected to prevent the escape of vapours and promote swelling of the charge, which is in accord with the findings of Fischer.

ROSE'S METHOD FOR STUDYING MACROSTRUCTURE OF COKE.

In another portion of his contribution, Mr. Davis reminds the Committee that Dr. Rose, of the Koppers Company, has developed a method for studying the macrostructure of coke which has been of considerable value in estimating the carbonizing properties of coals. Reference to this method will be found in an appendix to the Fourteenth Report of the Gas Investigation Committee, presented at the meeting of the Institution of Gas Engineers in 1925, and published on p. 909 of the "JOURNAL" for June 17, 1925; and also in the prize-winning paper of the Research Section of the Woodall-Duckham Companies, which appeared in the "Coke Competition Number" of the "JOURNAL," dated Nov. 9 of the same year (p. 13). A full-sized piece of coke is cut with a thin alundum cutting wheel running at high speed; and after preliminary rough grinding to a flat section, the surface is coated with a mixture of 98 p.ct. plaster of paris and 2 p.ct. light magnesium oxide. The surface is then polished with silicon carbide of increasing fineness; the plaster coating being renewed when necessary. Final polishing is done with levigated alumina. When the surface is properly prepared, the structure of the coke stands-out against the white background with remarkable clearness, and renders photographing easy when desired.

Mott has made a study of coke formation, from which he concludes that there would appear to be a simpler general relation between the ultimate analysis of coals and their relative coking abilities than is usually accepted. Usually, the bright coals with carbon content higher than 85 p.ct. (and probably below 91 p.ct.) are coking coals; and the higher the carbon content within these limits, the better is the resultant coke in coke oven practice. Coals of carbon content of about 82 to 84 p.ct. would seem to yield an inferior metallurgical coke; and those with a carbon content lower than 82 p.ct. would appear to be non-coking in general practice.

A NEW TINNING COMPOUND.

Remarkable Penetration.

Recently we witnessed a demonstration of a new tinning compound possessed of remarkable penetration. Dirt, grease, rust, tar—nothing seemed to make any difference to the coating of the surface with a continuous film of tin. Simultaneously with the penetration of the tin, the dirt or rust rose to the surface and could be wiped off. This new compound is a Canadian invention, and is supplied by the Soldo Company, of Sicilian House, Southampton Row, W.C. 1. It is known as "Soldo," and consists of a white powder intimately mixed with powdered tin. The makers claim that any metal, except aluminium, can be tinned with this compound; and certainly it is unnecessary to clean mechanically the metal to be worked on.

N.P.L. TESTS.

Not long ago the National Physical Laboratory carried out many experiments on "Soldo," and their results confirm the makers' claims. The metals dealt with included phosphor bronze, a nickel-manganese-copper alloy, steel, cast iron, and rusty steel. In each case the metal was heated up by a blow-pipe, and the "Soldo" was sprinkled on the surface to be tinned. The powder, it states in the report of the N.P.L., melted, and rapidly produced a continuous tinned surface. In every instance the tin actually penetrated the metal, and provided a thorough bond. We were shown the National Physical Laboratory's microphotographs, which included a photograph taken at the edge of a piece of rusty steel which was tinned, without any previous preparation, by "Soldo" rubbed in with a soldering iron. In the report, this specimen is commented on as follows: "The 'Soldo' is seen to have effectively removed the rust and formed good contact with the steel. This was the case throughout the whole of the section examined where 'Soldo' had been applied."

USE OF "SOLDO" FOR METER REPAIRS.

The cleansing properties of "Soldo" are so extraordinary that the labour involved in cleaning, preparatory to ordinary tinning, is entirely eliminated, however rusty, corroded, or oily the metals may be; and as the compound contains no acid, the metals treated remain permanently tinned.

Already many gas undertakings have found "Soldo" extremely useful for meter repair work in particular; and for tinning unions, &c., it should be of great service. The fact that it penetrates paint is an advantage, as also are its labour-saving properties. On jobs where a large quantity of solder is required, it is economical to use "Soldo" as a tinning material. All that is necessary is to heat the metal—for example, by means of a gas blow-pipe—to a little above soldering heat, and then sprinkle on the "Soldo." The most economical way in tinning large surfaces is to follow over the molten "Soldo" with a thin steel rod.

WESTERN JUNIOR GAS ASSOCIATION.

Visit to the Bristol Gas Company.

The third Meeting of the session took the form of a visit to the Bristol Gas Company, on Saturday, Dec. 3, when 55 members were shown over the automatic carburetted water gas plant at the Canon's Marsh Works, the gas drying plant at the Stapleton Road Works, and the stove and meter workshops at Barton Street.

Short descriptive papers had previously been sent to all members, who were thus able to follow the workings of the different plant. The papers were subsequently discussed. Tea was provided at Barton Street, where the presence of two honorary members—Mr. S. E. Halliwell, Secretary, and Mr. R. Robertson, Engineer, of the Bristol Gas Company—was much appreciated.

It was proposed by Mr. ARMITAGE, seconded by Mr. SPENCER, and carried with acclamation, "That a hearty vote of thanks be accorded the Bristol Gas Company for the excellent meeting."

The PRESIDENT (Mr. Arthur Marsden) referred to the sad loss sustained by the Association in the death of Mr. T. L. Robertson; and the members passed a vote of sympathy, standing in silence.

CANON'S MARSH WORKS AUTOMATIC CARBURETTED WATER GAS PLANT.

By J. WILSON, Assistant Superintendent at the Works.

The plant is equipped with self-clinkering generator and annular boiler, automatic operator, and hydraulic coke charger, and includes the "back-run" process and waste-heat boiler.

SELF-CLINKERING GENERATOR AND ANNULAR BOILER.

Surrounding the lower portion of the generator is the annular boiler, which utilizes the heat for the production of a low-pressure steam supply that is automatically used in gas making. The lower part of the boiler also aids the removal of clinker which may tend to adhere to the boiler shell. The boiler has a maximum working steam pressure of 75 lbs. per sq. in.; but this may be reduced to suit requirements. The setting at present is to blow-off at 35 lbs. per sq. in. This low-pressure steam supply is linked-up with an auxiliary supply which comes into action through a reducing valve in the event of the pressure falling to 25 lbs. per sq. in. High and low water alarms, blow-off valves, pressure gauge, &c., are fitted; and the water supply is controlled from the operating floor. The upper portion of the generator is lined with fireclay blocks.

ROTARY GRATE AND ASH PAN.

The rotary grate is conical in shape. The apex is fitted with a cast steel cap prepared with holes for the passage of steam, air, and gas. The grate is carried on its outer edge by a hollow semi-steel drum, the bottom of which is attached to the base of the ash pan. The pan revolves on rollers concentrically to the generator, and the drum and grate eccentrically as they are out of centre with the pan. The outer seal is formed by an extension of the boiler shell. Extending to the underside of the grate is the blast and reverse make connection, which is surrounded by the inner seal. The pan is driven by an electric motor through reduction gear. The clinker is broken and crushed between the grate and crushing plates fitted to the boiler shell, and is deposited in the annulus, to be removed by means of an inclined plough fixed to the generator and extending towards the base of the pan.

HYDRAULIC COKE CHARGER.

Coke is introduced through the top of the generator by the charger, which is operated each cycle by the auto-operator if desired.

CARBURETTOR AND SUPERHEATER.

Both these bodies are filled with checker bricks; the former having the bricks laid chimney-wise.

"BACK-RUN" PROCESS.

Steam is admitted into the top of the superheater, and passes through the carburettor, entering the generator above the fuel bed. The blue water gas made passes through the grate into the "back-run" or reverse make connection, which is coupled to the down pipe of the washer.

HYDRAULIC PRESSURE.

This system consists of a pump that delivers water to the accumulator, which is weighted to throw 250 lbs. per sq. in. Three pipe lines are laid from the pressure side.

(1) Relief pipe-line back to the suction tank.

(2) To auto-operator.

(3) To hydraulic cylinders (piston rod side) which are fitted to and operate the following valves, &c.: "Back-run" valve, steam, oil, stack, generator, carburettor, and superheater blast valves; also hydraulic coke charger.

Another pipe-line from each hydraulic cylinder is coupled to the valve box at the base of the auto-operator. This valve box has two ports running through its entire length. One port, as stated above, is coupled direct to the pressure side of the accumulator (constant pressure 250 lbs. per sq. in.). The other port is open to exhaust (suction tank).

AUTO-OPERATOR.

The hydraulic valves for operating the "back-run," steam, oil, stack, generator, carburettor, and superheater blast valves, and the coke charger, are attached to the valve box at the base of the operator. These valves are opened and shut by means of cams carried on two shafts—one setting the valves for the blow, the other for the run. The cam shafts are driven by an electric motor through suitable reduction gear. The proportion of blow to run may be varied by throwing the shafts out of gear with each other, and then rotating one to the desired position.

The length of the cycle may be altered by a shunt resistance. Any particular valve can be put in action for a shorter or longer period by altering the throw of the cam, which is attached to a graduated dial fixed to the shaft. Locking gears are provided so that the valves may operate only in their proper sequence. In the event of a valve failing, a safety device returns all the valves to closed position, opening the stack, stopping the operator, and giving warning by means of a "Klaxon." The same procedure takes place if the current fails.

The carburetted water gas installation was erected in 1911, and consists of two sets, each having a daily capacity of 1,000,000 c.ft. In 1923 a waste-heat boiler was added to No. 2 plant; and this plant has recently been reconstructed into an automatic plant, with the result that the gas making capacity has been increased from 1,500,000 to 1,700,000 c.ft. per day, and the number of men required to operate the single plant has been reduced from twelve to three. In addition to this, 85 lbs. of steam per 1000 c.ft. of gas made are produced by means of the waste-heat boiler and steam jacket.

Discussion.

The PRESIDENT asked whether the abrasive action on the ring of the rotating grate would wear on one part only.

Mr. MALSBURY (Weston): With the "back-run" process, is the efficiency greater than with the old plant?

Mr. CLARKE (Weston): Does the plant generate enough steam for its own working? If clinker forms on the side of the generator, what steps are taken to remove it?

Mr. SPENCER (Weston) asked whether the water used was softened or treated in any way.

Mr. BARRETT (Frome): Can any section of the plant be cut-out independently of the other sections?

Mr. WILSON replied that the ring in question being in three sections, any worn portion could be easily replaced. The oil efficiency of the plant was about the same as with the old plant. Enough steam was not generated for its own working; but when the pressure fell, the supply was automatically connected with the works supply. The water used was from their works softened supply. Any section of the plant could be cut-out, and thus blue water gas might easily be generated. Clinker might be removed by poking-down from the top and taking any accumulation from the bottom pan.

STAPLETON ROAD WORKS GAS DRYING PLANT.

By F. H. C. BULL, B.Sc., Chemist of the Works.

The gas-drying plant at the Stapleton Road Works of the Bristol Gas Company is capable of treating 8 million c.ft. of gas per day. It is placed between the outlet of the station meter and the inlet of the gasholder; being connected to each by 24-in. connections.

The plant consists of a Holmes rotary brush scrubber washer in two sections, each containing four chambers of 12 ft. diameter; the brushes being rotated by a steam engine placed between the two sections. Only one section is at present in operation.

A solution of calcium chloride to be used for the absorption of moisture from the gas is pumped from an underground tank of 1600 gallons capacity, through a liquor cooler to the washer, by means of a pump driven by belt from the engine fly-wheel.

The liquor-cooler consists of 48 tubes, each of length 10 ft. and diameter 2¼ in., giving a total cooling surface of about 280 sq. ft. It is supplied with water from the river at the rate of about 1000 gallons per hour. Centrifugal pumps are also installed for circulation of the liquor to the cooler from each chamber separately, for further cooling, if necessary. The necessity for the cooler arises from the fact that in absorbing moisture from the gas during its passage through the washer, the temperature of the liquor rises to the extent of about 3° Fahr., and, in addition, re-concentration of the weakened liquor further raises its temperature. The efficiency of the

process largely depends on keeping the temperature of the calcium chloride solution as low as possible.

The liquor passes from the cooler through the washer at the rate of 900 gallons per hour, and at a point between the cooler outlet and the washer inlet about 5 p.ct. of the liquor is tapped-off and passed over the evaporator for re-concentration; its strength having depreciated (as a result of its contact with the gas) to the extent of about 1° Tw.

The evaporator consists of a number of cast-iron pipes heated by exhaust steam from the engine. The trough beneath the evaporator collects the concentrated liquor and delivers it to the underground tank, where it mixes with the liquor coming direct from the washer.

It is found that the most suitable strength of solution to use is one containing about 40 p.ct. calcium chloride—*i.e.*, of 1·40 sp. gr., or 80° Twaddell at 60° Fahr.—though a slightly weaker solution must be used during colder weather, to prevent solidification of calcium chloride in the pipes. The strength of the solution used can be easily regulated by increasing or decreasing the amount of liquor passed over the evaporator.

The gas from the outlet of the station meter enters the washer at the point where the liquor leaves it; and thus the gas containing the most moisture (usually about 90 p.ct. saturation) comes in contact with the weakest solution of calcium chloride—the same principle being adopted as in ammonia washing. It is found that most of the moisture is taken out in the first chamber of the washer; and the gas leaves the last chamber containing only about 40 p.ct. of its original moisture. The amount of the moisture is determined by observing the dew-point of the gas at the washer outlet by means of a wet and dry bulb hygrometer. This instrument has been standardized by determinations made of the increase in weight of a **U** tube containing granular calcium chloride after passage of a measured quantity of gas. The actual quantity of moisture in the gas is obtained from the dew-point by means of tables drawn up for the purpose. The dew-point of the gas leaving the plant at Stapleton Road is about 38° to 40° Fahr. in summer, and from 28° to 30° Fahr. in winter.

The gas passes from the washer to the holder, which has a film of oil on the surface of the water and also in the cups. Re-absorption of water by the gas in the holder takes place only to a very small extent—as evidenced by the fact that the dew-point of the gas as it leaves the holder is usually only about 4° Fahr. higher than at the washer outlet.

The object of the above process is not to produce an absolutely dry gas, but to render its dew-point sufficiently low to prevent deposition of moisture on the district at the temperatures experienced there.

Discussion.

Mr. BARRETT (Frome) asked whether the capacity of the plant could be increased if the percentage of calcium chloride were increased.

Mr. ARMITAGE (Cheltenham) remarked that with the old system water would be deposited in the syphons. What would be the loss in volume from station meter to consumers, due to the moisture abstraction at the works?

Mr. WATSON (Messrs. Holmes & Son) stated that 1 million c.ft. of saturated gas at 70° Fahr. contained 25,000 c.ft. of water (about 2½ p.ct.). About 60 p.ct. abstraction was effected by the drying plant.

Mr. MALSBURY (Weston) asked what was the approximate thickness of the oil film on the water in the holder tank.

Mr. CLARKE (Weston) inquired what was the difference of inlet and outlet gas temperatures.

Mr. SPENCER (Weston) asked whether any definite leakages had been found by testing on the district.

Mr. BULL replied that if a stronger solution of calcium chloride were used, solidification would take place in the pipes. Its strength also depended on atmospheric conditions and the temperature of the liquor. A rough estimate of the loss in volume due to moisture abstraction would be about 0·5 to 1 p.ct. The oil film used was about ¼ in. thick. The inlet and outlet gas temperatures only varied by about 1° Fahr. Definite gas leakages on certain tested sections had been found and remedied.

BARTON STREET STOVE WORKSHOPS.

By JAMES CONWAY, Superintendent of Fittings Department.

The maintenance and testing of all gas appliances for use on consumers' premises necessitates the provision of modern and commodious workshops in order to deal with the work efficiently and expeditiously. It is unnecessary to emphasize the importance of securing the confidence of the consumer by giving the maximum of efficiency with all appliances, particularly in view of the present intensive competition.

In the early days, only limited accommodation was available at our Canon's Marsh Works, where minor repairs to cookers were carried out. The hire of gas cookers was introduced in Bristol in 1887, and in 1890 we had 1587 cookers on hire, which figure was increased to 13,095 in 1900, and six years later to 33,693.

In February, 1907, the chief offices and showrooms were erected at Colston Street, and workshops were provided at the back of the premises. For many years ordinary repairs to cookers were dealt with at these workshops; but with the rapid development of the business during recent years, coupled with the necessity of extending the scope of the Company's activities to include all classes of apparatus and fittings, the premises became inadequate, and it was absolutely necessary to provide more commodious shops.

It is well to explain that, apart from ordinary repairs, the Company's policy during recent years has been to re-model and modernize the cookers as they come from the district, providing an up-to-date high-efficiency hotplate, so that all cookers re-issued are of the most efficient type. Needless to say, this policy has given great satisfaction to consumers; and it is contended that it is the most effective means of preventing the more general adoption of electricity for cooking.

It is interesting to note that 97 p.ct. of our prepayment consumers have hired cookers, and the average yearly consumption is 29,000 c.ft. This quantity has been exceeded on the new housing sites, where the average consumption is about 35,000 c.ft.

In 1925, the number of cookers on hire had increased to 71,103, and at the present time we have over 77,000 in use. These figures do not include privately-owned cookers, of which there are many.

Regular propaganda and publicity among our 88,000 consumers has resulted in an abnormal demand for the Company's services in regard to all industrial and domestic problems in connection with the use of gas throughout the area of supply.

BARTON STREET WORKSHOPS.

The Directors fully recognize the possibilities of gas service; and they acquired the new workshops at Barton Street in 1925, in order to deal with the ever-increasing business. These premises, which were opened on Jan. 1, 1926, were originally designed for other purposes, and were unsuitable for our requirements. The important question of alteration, design, and equipment received careful consideration, and the plans were prepared and the work of reconstruction was carried out under the supervision of our Chief Engineer, Mr. Robertson. The site is central, being only half-a-mile from the chief offices and the centre of the city.

The ground floor is utilized as a general workshop, and has an area of 8000 sq. ft. Cookers brought off the district are received at the unloading dock and transferred to the adjoining stores near the main workshop. Each cooker is dissembled, and component parts are thoroughly examined and cleaned. All metal parts and enamel linings are treated with caustic soda in tanks of 120 gallons capacity. The necessary steam is raised by gas-heated tubular boilers. The various processes of cleaning and painting of parts and the packing of the cookers with silicate cotton all follow in sequence. The brass work is thoroughly cleaned by wire brush and buffing wheel, after which the cookers are assembled and tested, before being placed in the store ready for re-issue to the district.

The number of cookers re-conditioned daily is 40 to 50.

TESTING AND REPAIRING SHOPS.

The provision of facilities for repairing and testing gas fires, burners, water-heating appliances, &c., has received special consideration with a view to dealing with all types of apparatus, not only supplied by the Company, but also by the local gas-fitters, who are encouraged to use the facilities available. The services of the Company's Inspectors are invariably utilized by the outside gas-fitters in advising on the fitting and adjustment of special installations.

STORES AND OFFICES.

The first floor, which has an area of 6300 sq. ft., is utilized for stores accommodation, office staff, and assembly room for district foremen and fitters.

All stores are served from a specially designed counter arranged in three sections: Stove maintenance, stove fitting, and other grades of fittings. The racks, bins, and drawers are all arranged at the nearest point to the particular department requiring the stores, and the men are served with promptitude and care.

The fitters' assembly room is provided with suitable desks for each man, where he has direct access to his foreman. The room is a distinct advantage in dealing with the men, who have comfortable conditions for the entry of their work on their time and record sheets, and for discussing details of the work which they have to carry out.

POWER, HEATING, AND LIGHTING.

The power is supplied by an 18-H.P. Crossley gas engine, and the power units include drilling machines, emery wheels and buffs, hack saws, screwing machines, punching and shearing machines, turbo-fan for forge, &c. Two electric lifts are in use between the various floors.

"Belvedere" lamps with distance-control are used for main shop and stores lighting; and the building is heated by a "Robin Hood Major" boiler (coke fuel; overhead system).

Cloak rooms, cycle accommodation, and dining-room are provided. The rooms are light, and are well heated and ventilated. In the general lay-out every consideration has been

given to add to the comfort of the men, which is essential for efficient work.

Discussion.

Mr. PATERSON (Bath) congratulated all concerned on the excellent workshops.

Mr. LLOYD (Weston) asked whether piece-work rates were employed for cooker re-building. How many cookers were repaired?

Mr. EVANS (Gloucester) asked how many men were employed, and whether the casings from the old cookers were used again.

Mr. ARMITAGE (Cheltenham) spoke in high terms of the testing shop, and asked for any figures as to the efficiency of the modern geyser.

Mr. CONWAY, replying, stated that with present-day competition the consumer would get the greatest efficiency from the free maintenance of cookers. No piece-work was done. About one cooker per man was turned out daily; about 40 men and boys being employed in this department. Thus about 40 cookers per day were remodelled. Old casings are re-used if in fit condition. All geysers and ventilating fittings were tested for efficiency before being sent out on the district.

The authors were heartily thanked for their papers.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

A Meeting of the Scottish Western Juniors took place in the Royal Technical College, Glasgow, on Saturday, Dec. 3—Mr. R. FIFE, the President, in the chair.

The President called on Mr. D. Melvin to read his thesis which gained the Diploma of the Institution of Gas Engineers.

THE "ST. MUNGO" WASHER SCRUBBER—EXPERIMENTS IN SCRUBBING.

By DUNCAN D. MELVIN, of Uddingston.

[EXTRACT.]

The "St. Mungo" washer scrubber is the invention of Mr. John K. Frazer, Manager of the Dalmarnock Station of the Glasgow Corporation Gas Department. It was designed to give the advantages of the centrifugal scrubber with the absence of moving parts, and with a view to providing maximum contact between gas and liquor. The following paper deals with a series of tests carried out at different stages in the preliminary period of experiment.

The removal of ammonia depends on the solubility of ammonia in water. One volume of water will absorb over 700 times its volume of ammonia gas at 60° Fahr. and 30 in. mercury column; and the absorption increases as the temperature is lowered. The absorption of ammonia from coal gas, however, is affected by more than the relative temperatures of the gas and absorbent, and depends on the vapour pressure exerted by the gas and that exerted by the dissolved ammonia in the liquor. If pure ammonia gas is to be absorbed, then the problem is simplified; but with coal gas, where the ammonia only represents about 1·5 p.ct. of the total volume, it will only exert a very small vapour pressure.

Gas liquors of varying strengths exert appreciable vapour pressures, and, if brought into contact with coal gas free of ammonia, will give up ammonia to the gas until equilibrium is reached. Liquor of as low a strength as 1 oz. exerts a vapour pressure equivalent to 4 grains per 100 c.ft. This necessitates the use of clean water to extract the last traces of ammonia from the gas.

The following points are noted for efficient scrubbing and washing.

(1) The temperature of the gas and liquor, or water, should be as low as economically practicable, but not so low as to affect the action of the oxide in the purifiers.

(2) The gas should be subjected to a constant decreasing strength of liquor, and finally to clean water.

(3) The amount of water used should be as low as possible, consistent with efficient ammonia abstraction, so as not to increase the volume, and consequently decrease the strength, of the finished liquor.

(4) There must be ample time contact to ensure that the absorbent does its work.

(5) Back pressure should be reduced to the minimum compatible with efficient working.

DESCRIPTION OF SCRUBBER.

The "St. Mungo" washer scrubber is of the static type. It consists of a cylindrical tower, divided into three sections. The bottom section acts as a receiver for the liquor descending from the tower. The middle, and largest, one is used for scrubbing with liquor, and the top for removing the last traces of ammonia by means of clean water.

The scrubber contains no packing; but at the bottom of the top and middle sections is a series of washing devices, so arranged as to divert the liquor in the form of cascades through which the gas has to pass. These washing devices extract tarry matter and also bring the gas and liquor into complete contact.

The liquor is supplied by a pump, and enters the scrubber through special spraying nozzles which turn it into the form of a fine mist. This mist exerts a maximum solvent effect on the ammonia in the gas. Water is sprayed, in like manner, into the top compartment, with a view to extracting the last traces of ammonia. A baffle is fitted on the outlet to free the gas of any spray.

PRELIMINARY TESTS.

The following tests were carried out, under working conditions, on the scrubber as originally designed.

Strength of Liquor.		Water.		Make per Day (24 Hours) Corrected.	Back Pressure.	Grains NH_3 per 100 C.Ft.		P.Ct. Efficiency.
P.Ct. NH_3 Inlet.	P.Ct. NH_3 Outlet.	Quantity per 1000 C.Ft.	P.Ct. NH_3.			Inlet.	Outlet.	
		Galls.			In.			
0·99	1·09	0 23	0·29	2,800,000	5·5	401·3	48·1	88
1·02	1·31	0·41	0·60	2,800,000	6·5	61·7	10 5	83
0·86	0·94	0·54	0·46	2,688,000	7·5	210·0	17·0	92
0·92	1·06	0·50	0·52	2,856,000	7·5	126·0	11·0	91

These tests were carried out under most severe and disadvantageous conditions of temperature of gas, scrubbing water, and scrubbing liquor, which, owing to adverse circumstances, were not under control. The efficiency was by no means poor, but the back pressure was found to be very high—namely, 7·5 inches—and means were sought to obviate this.

Alterations were made to the sprays, which were then set at an angle of 50° from the horizontal. The outlet from the top chamber was altered, and a series of pipes to take off the liquor fitted in. This was to relieve the banking-up of the liquor and water which was found to be taking place at the channels. This gave a test as follows:

Strength of Liquor.		Water.		Make per Day (24 Hours) Corrected.	Back Pressure.	Grains NH_3 per 100 C.Ft.		P.Ct. Efficiency.
P.Ct. NH_3 Inlet.	P.Ct. NH_3 Outlet.	Quantity per 1000 C.Ft.	P.Ct. NH_3.			Inlet.	Outlet.	
0 87	0 97	Galls. 0·52	0·54	2,750,000	4·8	78·2	13·6	82·6

The back pressure was reduced to 4·8 in., but the efficiency was also down. Means were now sought to bring up the efficiency while keeping back pressure down. A new type of spray was put in the water section, and a perforated plate inserted to aid further in bringing the gas and water into contact. This alteration increased the efficiency 5 p.ct.

Strength of Liquor.		Water.		Make per Day (24 Hours) Corrected.	Back Pressure.	Grains NH_3 per 100 C.Ft.		P.Ct. Efficiency.
P.Ct. NH_3 Inlet.	P.Ct. NH_3 Outlet.	Quantity per 1000 C.Ft.	P.Ct. NH_3.			Inlet.	Outlet.	
0·85	0·95	Galls. 0·50	0·50	2,650,000	4·5	98·7	12·3	87·6

Perforated plates were inserted in the liquor portion and a new liquor outlet placed at the seal. This increased the back pressure slightly with efficiency still the same:

Strength of Liquor.		Water.		Make per Day (24 Hours) Corrected.	Back Pressure.	Grains NH_3 per 100 C Ft.		P.Ct. Efficiency.
P.Ct. NH_3 Inlet.	P.Ct. NH_3 Outlet.	Quantity per 1000 C Ft.	P.Ct. NH_3.			Inlet.	Outlet	
0·78	0·92	Galls. 0·30	0·32	2,600,000	5·0	101·8	12·6	87·6

USING LIQUOR ONLY.

These tests showed that the scrubber had a good efficiency which would have been considerably higher if the gas and liquor temperatures had been more under control. The ammonia

passing the scrubber was still too high. This was judged to be the fault of the clean section of the scrubber being too small. This was borne out by experiments carried out using liquor only for scrubbing purposes.

Strength of Liquor.		Water.		Make per Day (24 Hours) Corrected.	Back Pressure.	Grains NH_3 per 100 C.Ft.		P.Ct. Efficiency.
P.Ct. NH_3 Inlet.	P.Ct. NH_3 Outlet.	Quantity per 1000 C.Ft.	P.Ct. NH_3.			Inlet.	Outlet.	
		Galls.						
0·51	1·09	..	..	2,600,000	3·5	113·2	24·7	78
0·77	0·84	..	..	2,400,000	3·4	83·0	20·0	76

An average efficiency of 77 p.ct. showed that the liquor portion of the scrubber was doing its duty.

It was found that the scrubber removed other impurities—carbon dioxide to the extent of 2 p.ct. and sulphuretted hydrogen to the extent of 13 p.ct.

Conclusions.

These efficiency tests proved that the scrubber had a potential efficiency of nearly 100 p.ct. The tests using liquor only showed that the water section was not large enough to purify the gas finally. The channels are apparently responsible for a fair amount of the back pressure; and these are being altered to reduce this. The amount of water used was moderate, and averaged 0·5 gallon per 1000 c.ft., or 7 gallons per ton of coal carbonized. The ammonia recovered, and sold as ammonium sulphate, was equivalent to 44 lbs. per ton of coal carbonized.

MANUFACTURE OF PURE LIQUOR AMMONIA IN GAS-WORKS.

By J. W. Boyle, of Greenock.

[Extract.]

The problems involved in the manufacture of liquor ammonia are: Dissociation of hydrogen sulphide, or desulphurization; dissociation of carbon dioxide, or decarbonation; dissociation of other impurities, such as pyridine; distillation of ammonia; condensation or cooling of steam-ammonia stream, to produce a dry ammonia gas; purification of ammonia gases; absorption of purified ammonia gases by water; disposal of effluent liquor and gases; and conservation and abstraction of heat.

The plant in use at Greenock consists of an overhead tank, to feed the plant with crude ammoniacal liquor, the liquor being pumped from the underground storage well by an 8·75 B.H.P. electric pump; a tar filter, followed by a liquor meter; a decomposing tower, for decarbonating and desulphurizing the crude liquor as completely as possible, each tray being fitted with a downward overflow and an upward gas passage; the liming vessel, which is connected with a mechanical lime mixer; the still for carrying-out the distillation, having trays of somewhat similar construction to those of the decomposing tower, the upper portion of the still being used to preheat the ingoing crude liquor; two water-tube condensers; an atmospheric condenser; an oil washer for the removal of pyridine; a caustic soda washer for removal of traces of carbon dioxide and hydrogen sulphide; a charcoal tower for removal of organic matter; a small vessel for the manufacture of small quantities of full strength (0·880) pure liquor ammonia; and an absorption tank. There is, in addition, an air compressor for forcing the pure liquor ammonia from the absorption tanks into railway tanks. The plant is worked in three shifts with one man per shift.

The capacity of the crude liquor tank is 13,500 gallons, and it is provided with a counterbalanced float connected to an indicator inside the still-house. The tank is refilled each time the indicator rises 6 in., to keep the pressure head constant. From this overhead tank the crude liquor gravitates through the filter in two streams; one passing through the preheater and on to the decomposing tower, and the other direct to the decomposing tower. The stream which passes through the coil of the preheater is heated by the steam-ammonia vapour rising from the still, and is then admitted to the decomposing tower. The second, and lesser, stream is admitted cold to the top of the decomposing tower; its purpose being to exercise an absorbing or controlling effect on the vapours ascending the tower. In the latter, a large percentage of the carbon dioxide and hydrogen sulphide impurities are driven off from the crude liquor. At the temperature required for this, a certain percentage of free ammonia will be liberated; and it is with the object of recovering this ammonia that the waste gases from the decomposing tower are led into the foul main, so that ammonia passing may be arrested at the condensing plant.

The heated liquor leaving the base of the decomposing tower has been relieved of as much as 80 p.ct. of the original impurities. It gravitates thence through the liming vessel to the still. The functions of the latter are to liberate the fixed ammonia and to assist in arresting impurities still contained in the liquor.

The limed liquor entering the still is subjected to the further action of live steam, which drives-off practically the whole of the ammonia vapours. The effluent liquor runs to waste through seal pots connected to the base of the still. It is desirable that the ammonia content of the effluent liquor should not exceed ·015 p.ct. To reduce it appreciably below this figure is usually uneconomical.

The heat of the steam-ammonia vapours rising from the still is largely abstracted by the cold crude liquor entering the preheater; this liquor being heated to about 85° C. before it passes to the decomposing tower.

The partially cooled vapours then pass forward to the water-tube condensers. The condensate is returned to the top chamber of the still. An analysis of this condensate is as follows: Sp. Gr., 0·948; NH_3, 13·539 p.ct.; H_2S, 0·005 p.ct.; and CO_2, 0·325 p.ct.

The ammonia vapours now pass through an atmospheric condenser; any condensate gravitating to the still. The ammonia gas is next treated in an oil washer for the removal of pyridine; heavy fuel oil or distilled anthracene being used. The caustic soda washer is a cylindrical vessel, through which the ammonia gas is bubbled to remove the last traces of carbon dioxide and hydrogen sulphide. It is followed by a charcoal tower for the removal of organic matter. The caustic soda solution is made up to about 20 to 22° Twaddell.

The purified ammonia gas now passes into the absorption vessel, which contains water; and the solution is brought up to the required concentration, which is usually 25 to 30 p.ct. ammonia.

Working Conditions on the Plant.

The following is a rough guide as to the temperatures, &c., to be maintained at the different portions of the plant.

Decomposer top	70° to 80° C.
,, 9th tray	85° ,, 90° C.
,, 1st ,,	96° ,, 98° C.
,, bottom chamber	100° C.
Hot liquor *ex* preheater	80° to 85° C.
Gas temperatures—	
Inlet preheater	100° C.
,, 1st condenser	94° C.
,, 2nd ,,	40° C.
,, atmospheric condenser	Atmospheric.
,, oil washer	,,
Pressures—	
Gas inlet preheater	3½ in. mercury.
,, outlet condenser	,, ,,
Steam—	
Main feeder from boiler	60 to 80 lbs. per sq. in.
Reducing valve to still	16 ,, ,, ,,
,, ,, ,, decomposing tower	18 ,, ,, ,,

The most that can be done in every-day working is to apply and conserve the heat available to the best advantage, giving constant attention to the method of operation, and, assuming the preheater to be of good design, to work it so as to abstract the highest possible percentage of heat from the steam-ammonia vapour arising from the still, by transferring it to the incoming liquor, thus saving the quantity of steam that would be required to raise the liquor temperature to about 85° C.

Losses.

There are several sources of loss in the manufacture of pure liquor ammonia which may be minimized by careful attention. The effluent liquor requires special attention, especially having regard to the increased work imposed upon the still by the reflux returning from the condensers. Where pumps are used, considerable loss may be incurred by leaky glands. Deep stuffing boxes or multiple glands are recommended to reduce losses from this source. It is more satisfactory, however, when the plant is designed in such manner as to reduce pumping operations to the absolute minimum.

A further source of loss is met with owing to volatilization in the loading of railway tanks; this being especially noticeable in warm weather. If the loading pipe dips to nearly the bottom of the tank, and the tank is sprayed with cold water before loading, part of this loss may be prevented.

In sampling the liquor after the tanks have been loaded, the samples are generally taken by dipping a long glass tube into the liquid, and withdrawing after closing a bottom valve. The liquor adhering to the outside of this tube loses its ammonia rapidly by volatilization, and flows into the sample bottle with the liquid contained in the interior of the tube, thus reducing the ammonia content of the sample. The better method is probably to sink the sample bottle into the liquid. This will secure a good sample, representative of the bulk, provided the neck of the bottle is not too wide. The bottle should be immediately sealed to prevent further loss.

The absorption tanks are placed in a covered building out of the rays of the sun, to prevent heating and consequent losses. The tanks are cooled by a water spray, to assist absorption when necessary. When tanks are being re-sealed, the vented air is passed into water in a small tank, and the washings are returned to the well.

The wisdom of being prepared to take advantage of the most

profitable outlet for our ammonia products at any time is obvious. The Greenock plant is laid out so that sulphate of ammonia and/or liquor ammonia may be manufactured. Provision has also been made for the installation of additional plant to make anhydrous liquid ammonia, household ammonia, &c., when found profitable to do so.

Discussion.

The CHAIRMAN said that Mr. Melvin was to be congratulated on having the distinction of being the first student in Scotland to gain the Diploma of the Institution of Gas Engineers. His thesis should prove of particular interest to students who were endeavouring to emulate his excellent example. Mr. Boyle's paper, being on a subject with which few of them had had much practical experience, was of unusual interest. Mr. Boyle had dealt with the subject in an intimate way. Mr. Fife remarked that his only regret was that he did not give much enlightenment on the financial side of his subject.

Mr. J. W. MCLUSKY (Glasgow) said he was particularly glad to be present to congratulate Mr. Melvin publicly on the manner in which he had dealt with his subject. A thesis should be concise. Students fell into the natural trap of writing lengthy articles containing matter drawn from text-books, which did not impress the examiners, who expected originality and also something in which the student showed his initiative. Mr. McLusky called the attention of students to the oral examinations, when they must be prepared to speak clearly and show a thorough knowledge of the subject. He complimented Mr. Boyle on his paper, which would prove useful to students. Had the author added a financial statement, the paper would have gained considerably in commercial interest.

Mr. C. CHAPMAN (Glasgow) suggested that certain statements in Mr. Boyle's paper were open to question. The speaker was of the opinion that too much stress was always laid upon the increase of the fixed ammonia salts when liquor was exposed to the air. Evaporation might raise the relative proportion of fixed ammonia, but there was so little transition from free to fixed that it made no material difference in working cost. Mr. Boyle was fortunate in his easy solution of the problem of effluent disposal. Passing the liquor through a coil surrounded by hot vapours seemed to be an inefficient method of heat interchange; and he suggested that the liquor on the outside of the coil would result in greater transference of heat, and would cut down the excessive consumption of cooling water. The author's remarks on sampling were fully justified; and he would find that a syphon gave the truest sample, especially if the limb in the tank was constantly moved up and down.

Mr. R. D. KEILLOR (Greenock) observed that he had listened with interest to Mr. Chapman's contribution to the discussion, but did not agree with him when he said the reconstructed plant at Greenock was inefficient. The plant might appear to Mr. Chapman inefficient theoretically; but having considerable experience with liquor ammonia plants, he (the speaker) questioned if any other plant was capable of giving better all-round results. It was obvious that the strength and composition of the crude liquor and the standard of purity desired in the final product had a bearing on the amount of steam and lime used, and also on over-all efficiency. Mr. Chapman had something to say about the preheating efficiency of his plant, but in his opinion, preheating could be overdone. Theoretically, of course, the crude liquor should be preheated as close to the decarbonating point as possible; but then it might be desirable to obtain shock-cooling conditions to improve washing efficiency.

Mr. BOYLE, in reply, said it was acknowledged by most authorities on the subject that ammoniacal liquor in storage tended to form fixed salts through oxidation, proportional to the period of storage. The disposal of effluent liquor was always a problem. He thanked Mr. Chapman for his suggestion regarding sampling the purified liquor, and also for his interesting contribution to the discussion.

On the motion of the PRESIDENT, Mr. Melvin and Mr. Boyle were thanked for their contributions.

The next item on the syllabus of the Association is a joint meeting with the Eastern District in Edinburgh on Jan. 14, when Mr. J. G. Davidson, of Edinburgh, will read a paper on "Organization in Theory and Practice."

SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).

Visit to the Granton Works of the Edinburgh Gas Department.

On Dec. 10 the Scottish Junior Gas Association (Eastern District) visited the Granton Works of the Edinburgh Corporation Gas Department. Meeting at Princes Street Station, members were conducted by chars-a-bancs to the works, which are situated on the shores of the Firth of Forth some three miles from the centre of the city. On arrival, they were divided into groups and conducted over the plant.

These works were fully described in the "JOURNAL" for Oct. 13, 1926, p. 95. They at once impress visitors with their spaciousness and the amount of room available for their further development. The erection of the original works at Granton commenced in 1898, was in accordance with designs and to specifications prepared by Mr. W. R. Herring, at that time the Engineer and Manager to the Edinburgh and Leith Gas Commissioners, and who was responsible in large measure for the inception of the Eastern District Junior Association in Scotland.

THE NEW RETORT PLANT.

Situated in the old No. 2 Retort House—in which are also two benches of inclined retorts—the new plant consists of 88 Woodall-Duckham verticals, having a capacity of 11 million c.ft. per diem, arranged in two parallel benches, each containing eleven settings. Each retort has a nominal throughput of 8·55 tons per 24 hours, giving a total capacity for the plant of 752 tons per 24 hours. However, 9 tons have been carbonized. The coal breakers, elevators, and conveyors are capable of dealing with 100 tons per hour.

On the extractor floor level were observed four "W.-D." waste-heat boilers of the firetube type, capable of generating 14,100 lbs. of steam per hour, with feed water at 160° Fahr. and a steam pressure of 120 lbs. per sq. in.

The generator house, adjacent to the retort house, received much attention from the visitors, who were also most interested in the coke plant. This has a total storage capacity of 500 tons, comprising 50 tons of fines, 100 tons of small coke, and 350 tons of large coke. Two "Bronco" screens provide for rough screening, with suitable hoppers for breeze and large coke, and six rotary screens for grading into the three sizes. Having inspected the condensing plant, the exhausting plant, and the carburetted water gas plant, which latter is capable of producing 2½ million c.ft. per day, the visitors passed to the meter house, wherein is fitted a new Fairweather recording calorimeter of the latest design. The installation, it was explained, had only been completed the week before.

WELCOME TO THE JUNIORS.

The tour of inspection completed, the visitors were met by eight members of the Gas Committee.

The CONVENER (Councillor Gregorson), in welcoming the visitors, said he was very proud indeed to see so many of them present.

After tea, which was provided by the Edinburgh Corporation, Mr. H. H. GRACIE, the Gas Engineer and Manager, said how pleased he was to throw open the works to the young men in the industry, who, in order to increase their knowledge, and to gain probably new experiences, had sacrificed their leisure time. They had doubtless seen a very fine works; and their interest, he thought, would have centred chiefly in the new vertical installation, which in itself was a splendid piece of work, on which no time, money, experience, or knowledge had been spared to embody everything known to bring the plant absolutely up to date. All machinery had been laid down in duplicate, to meet any breakdown. Mr. Gracie then gave a résumé of the actual working results since the inauguration of the plant in October, 1926, and then referred to the visit he, together with members of his Committee, were about to make to the Continent to examine the waterless holder, which it was claimed required less space for the same gas, was cheaper, and did not take so long to erect. In addition, it was proposed to put down a new sulphate plant. In concluding he promised to give the members more information on these on their next visit to Granton.

MR. GRACIE CONGRATULATED.

Mr. FARQUHAR (President of the Association), in replying to the welcome expressed by Councillor Gregorson and Mr. Gracie, said he was sure all had had a very interesting afternoon. It was, he said, a particular pleasure on his part, as he was re-visiting the scenes of his gas-works childhood. There was always something attractive about a visit to Granton, and always something new. Edinburgh might well be proud of its gas-works, which were up to date and reflected great credit on the management. The extension of plant they had seen that day, he said, must have impressed everyone not only by its magnitude, but on account of the excellent workmanship displayed. For those on smaller works, the capacity of the plant was a matter of special interest. He took the opportunity of congratulating Mr. Gracie on his election as President of the North British Association of Gas Managers, and in the name of the Scottish Eastern Juniors wished him every success during his term of office. The Juniors were indebted to the Edinburgh Corporation Gas Committee, Mr. Gracie, and his Assistant, Mr. J. Jamieson, for the splendid arrangements made for their enjoyment that afternoon.

Councillor GILZEAN (Vice-Convener) replied.

Councillor HARVEY then proposed a vote of thanks to the guides; and a vote of thanks to the Convener, for presiding, terminated the meeting.

GAS ACTS FOR 1927.

(*Continued from page* 749.)

COVENTRY CORPORATION.

One of the fourteen parts into which the Coventry Corporation Act is divided relates to gas; and the main object of this part is to confirm and make binding upon the parties an agreement entered into in September, 1926, for the purchase of the undertaking of the Kenilworth Gas Company, for the sum of £38,500. The gas supply limits of the Corporation are extended so as to include, in addition to the Kenilworth gas district, the parishes of Corley and Fillongley, in the rural district of Meriden; the parish of Baginton, in the rural district of Warwick; the urban district of Bulkington; the parishes of Anstey Shilton and Willenhall, in the rural district of Foleshill; and the parishes of Brandon and Brentford, Combefields, Ryton-on-Dunsmore, and Wolston, in the rural district of Rugby.

The price to be charged by the Corporation for gas supplied by them within the city and the parish of Foleshill shall not at any time exceed 1s. 2d. per therm; and the price within the remaining parts of the gas limits, other than in the Kenilworth area, shall not exceed by more than 2·4d. per therm the price charged within the city in like circumstances. The price for gas supplied in the Kenilworth district has been varied from the terms set out in the Bill; and the portion of the clause relating to this matter now reads:

(2) The price to be charged by the Corporation for gas supplied in the Kenilworth gas district by them to persons who shall burn the same by meter shall not—

(*a*) Within the urban district of Kenilworth and within a radius of two miles from the north-eastern corner of the lands secondly described in the first schedule to the Kenilworth Gas Act 1917 (i) for a period not exceeding eight years from the passing of this Act exceed by more than 4d. per therm, and (ii) after the expiration of such period exceed by more than 2·4d. per therm, the price for the time being charged within the city under like circumstances and for the same purposes for a corresponding supply: Provided that the price within the said urban district and radius shall not at any time exceed 16·4d. per therm; and

(*b*) Beyond the said urban district and radius exceed by more than 2d. per therm the price for the time being charged by the Corporation within the said urban district and radius under like circumstances and for the same purposes for a corresponding supply.

(3) If at any time within eight years after the passing of this Act gas is supplied from the Foleshill Gas-Works of the Corporation to the gasholders on the land secondly described in the first schedule to the Kenilworth Gas Act 1917, and set out in the fifth schedule to this Act, the price to be charged for gas in the area referred to in paragraph (*a*) of sub-section (2) of this section on and from the first day of the quarter commencing immediately after such supply is first afforded shall not exceed by more than 2·4d. per therm the price for the time being charged within the city under like circumstances and for the same purposes for a corresponding supply.

(4) If the Corporation allow discount on accounts for gas supplied within the city, the same rate of discount shall be allowed in respect of accounts for gas supplied within the Kenilworth gas district.

Charges for prepayment meters in the Kenilworth district are to be: With fittings and cooker, 3·6d. per therm; with fittings but no cooker, 3d. per therm; and for hire of prepayment meter only, not exceeding 10 p.ct. on the cost of the meter. The quality of the gas in the limits other than the Kenilworth district is to be a calorific value of not less than 480 B.Th.U., and in the Kenilworth district 400 B.Th.U. In the Act there has been added to this clause: "Provided that if the Corporation shall supply any part of the Kenilworth gas district with gas from the Foleshill Gas-Works of the Corporation, the calorific value for the part of the area so supplied shall be the calorific value for the time being declared in respect of gas supplied by the Corporation in the gas limits other than the Kenilworth gas district."

Power is given to the Corporation to borrow £39,000 in connection with the purchase of the Kenilworth gas undertaking; the period of repayment being thirty years from the date or dates of borrowing.

[*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

FARNHAM GAS AND ELECTRICITY COMPANY.

The circumstances in which the Farnham Gas and Electricity Company promoted the measure which in due course came before the Unopposed Bills Committee of the House of Commons were explained on that occasion by the representative of their Parliamentary Agents. The Company were incorporated in 1910 with powers to work a gas and electricity undertaking. Since then they had obtained a Gas Order in 1914 and another in 1926; while an Order by the Electricity Commissioners was at that time awaiting confirmation by the House of Commons. The Company, in common with most gas and electricity companies, found that they could not in the ordinary way get borrowing powers from the Electricity Commissioners for the purpose of their electrical undertaking, nor could borrowing powers be obtained from the Board of Trade in respect of the gas undertaking. The Board of Trade and the Electricity Commissioners held that they could not grant borrowing powers in the ordinary way because they related to the combined undertaking, and would be secured upon both the electricity and gas undertakings. Owing to the criticism that had been made of this position in regard to electricity, a Public Act was passed in 1925 authorizing the Electricity Commissioners to make Orders in respect of borrowing powers required in such circumstances; and the Order then awaiting confirmation was made under the Act. This disposed of the difficulty so far as the electricity undertaking was concerned. With regard to gas, however, the Board of Trade were still without powers similar to those conferred upon the Electricity Commissioners by the Act of 1925. In 1926, the Company obtained an Order from the Board of Trade authorizing the raising of £66,000 new capital, but with no borrowing powers; and at the time this Order was granted, the Board of Trade suggested that the Company should promote a Bill in Parliament for the purpose of obtaining the necessary authority to raise the money by way of loan. Accordingly, in agreement with the Board of Trade, the Act contains the following clause:

Power to Board of Trade to Authorize Company to Borrow.—The Board of Trade may, by Special Order under section 10 of the Gas Regulation Act, 1920, subject (after consultation with the Electricity Commissioners) to such conditions, limitations, and provisions as they see fit to impose or insert, empower the Company for the purposes of the gas undertaking to borrow money on mortgage of the whole of the undertaking of the Company.

A clause in the original Bill giving power to require users of internal combustion engines to provide silencers has been omitted from the Act, in accordance with a suggestion by the Board of Trade. The following clause remains in the Act, in spite of a suggestion by the Board of Trade that such a supply as is referred to in it should only be given by arrangement between the Company and the undertakers authorized to supply in the adjacent area:

The Company may by agreement supply gas or electricity to any house or building which, or the curtilage of which, is partly within and partly outside the limits of supply, or the area of supply, as the case may be, in the same manner as if such premises were wholly within such limits or area respectively.

There are clauses giving power to enter premises, though they have in one or two respects been somewhat modified from those reproduced in the "JOURNAL" when reviewing the Bill. The one giving power forcibly to enter unoccupied premises supplied with gas or electricity, doing no unnecessary damage, has had added to it the words: "and repairing all damage caused by such entry, and shall on quitting the premises leave the same secure." The provisions regarding the application of excess profits over the authorized rates of dividend, remain in the Act; but those relating to the sale of capital and payment of commissions are reduced, by the omission of the stipulation that, before offering shares or stock to be issued for sale by auction or tender, they might be offered to the gas and electricity consumers of the Company and persons in the employ of the Company at the then value thereof. The clauses referring to capital have also been modified. Borrowing powers are granted up to one-half of the capital raised; but without the consent respectively of the Board of Trade or the Electricity Commissioners, the Company shall not pay interest at a higher rate than 6 p.ct. on money so borrowed. The preference shares or debenture stock may be redeemable. Authority is sought to appoint a managing director. There has been deleted a clause to the effect that a Judge of any Court or a Justice should not be disqualified from acting in the execution of any Act or Order from time to time relating to the Company by reason of his being liable to any rate.

[*Parliamentary Agents: Messrs. Sherwood & Co.*]

GREENOCK BURGH EXTENSION.

In the original Bill of the Corporation of Greenock the proposals were to extend the burgh so as to include the existing burghs of Port Glasgow and Gourock, as well as parts of the parishes of Inverkip, Port Glasgow, and Kilmacolm, and to extend the gas supply limits of the Corporation to the added areas. It was further intended to amalgamate the gas undertakings at Port Glasgow and Gourock with the Greenock undertaking, and to concentrate (at any rate for the greater portion of each year) the manufacture of gas at Greenock. In the main these proposals have disappeared from the Act. Part of the parish of Inverkip is added to the burgh; and the limits for the supply of gas are extended accordingly.

[*Parliamentary Agents: Messrs. John Kennedy & Co.*]

LEEDS CORPORATION.

The main object of this Act is to extend the boundaries of the City of Leeds so as to include the township of Templenewsam, Alwoodly, and Eccup, and part of Austhorpe, all of which are

within the Corporation's gas limits. Originally the inclusion of the urban district of Gildersome was proposed; but this was struck out of the Bill. There is a clause defining the Corporation's gas limits as being the whole of the city. The Bill was opposed before the House of Lords Committee by the Calverley and Horsforth District Gas Company, who have power to supply, and are supplying, gas in a small area in which the Corporation also have powers to supply, but in which the Corporation are not supplying. After some discussion, an agreement was arrived at, with the result that a clause has been added to the Act providing that the Company may sell and the Corporation may purchase so much of the Company's undertaking as is situate within the city (except so much thereof as is situate in the area comprising the Horsforth Station of the London and North-Eastern Railway Company), at such price and upon such terms as may be agreed. Thereafter the Company shall not supply gas in, or for use within, the city, except for use at the said station. It was explained during the proceedings that the boundary of the Corporation's area passes right across the station.

Part IV. of the Act empowers the Corporation to purchase the undertaking of the Crossgates, Halton, and Seacroft Gas Company, Ltd., and confirms an agreement entered into between the parties for that purpose; the price named in the Act being £47,044. The transaction is to be completed on the 31st inst.; and in addition to the sum named, the Corporation are, immediately upon the completion of the purchase, to pay to the shareholders such a sum as will make their total net dividend for this year equivalent to that received by them for 1926. Thirty years from the day of transfer is allowed for repayment of the money borrowed for the purpose. The agreement provides that on completion of the purchase the Corporation shall pay as compensation for loss of office £750 to the Directors, and £3000 to Mr. William Wilkinson, the Manager and Secretary of the Company. The Corporation are to pay the reasonable costs of the Company in connection with the negotiations, and all other matters down to the distribution among the shareholders of the amounts due to them.

[*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Cast-Iron Pipe Makers.

SIR,—The announcement was made in several of the newspapers recently that an international "ring" of cast-iron pipe makers had been brought into operation, covering America, England, France, and Germany; and the name of this Company was quoted as the British firm in that "ring."

The Stanton Company are the largest producers of cast-iron pipes in Europe, made both centrifugally and otherwise; and we desire emphatically to deny any suggestion of any financial arrangement in regard to capital, or in regard to selling prices, with producers either at home or abroad.

We should be glad if you would give wide publicity to this statement, bearing in mind the incorrect information which has been circulated.

For the STANTON IRONWORKS COMPANY, LTD.
E. J. FOX,
Managing Director.

Stanton Ironworks Company, Ltd.,
Near Nottingham, Dec. 12, 1927.

Dry Oxide.

SIR,—Referring to the paper by Mr. J. W. Thompson in your last issue, I should like to raise some important considerations. I would point out, however, that I am a chemist, and, unlike Mr. Thompson, I see the problem from the point of view of the supplier of oxide, being closely connected with a firm who have had many years' experience in investigating, and where possible improving, the physical and chemical properties of oxides such as Dutch bog ore, natural oxide worked or quarried in England, and prepared or re-made oxide.

(1) Considerations of a purely chemical nature:

(*a*) The presence of water or water vapour accelerates reaction between gases and between a gas and a solid.

(*b*) Reaction between H_2S and Fe_2O_3 takes place only when the H_2S is in solution in water. In this connection, no doubt water vapour condensing from a gas containing H_2S will hold some H_2S in solution, and when condensed on to a surface of oxide the H_2S will be absorbed; but intimate contact between foul gas and damp oxide with a maximum surface area gives a higher absorption figure. In any case, condensation must be ruled-out if the oxide is to be maintained at 2½ p.ct. moisture. Also, condensed water takes some time to penetrate to the centre of a nodule of oxide, as Mr. Thompson will know if he has ever tried damping-down burnt oxide.

(*c*) Water which can be squeezed-out of oxide such as Dutch bog ore by pressing in the hands is admittedly useless; but a moisture content of 30-40 p.ct. in Dutch bog ore (with an open and sponge-like structure) is both useful and active in that it fills the minute pores or capillary tubes of the vegetable fibre and acts as a fisherman's net or catalyst, handing on the H_2S to the oxide in a suitable form for absorption.

(*d*) Careful laboratory tests have shown that the ideal moisture content for other natural oxides and for artificial oxides is 20-30 p.ct. Combined moisture may also be a salient factor; but its chemical and physical significance is little understood.

(2) Considerations of a commercial character:

(*a*) My firm, and I believe other importers of Dutch bog ore, have in the past endeavoured to dry-down the natural ore in Holland and elsewhere; but technical difficulties are far greater than they appear at first sight. This means that so much per ton—say, X shillings—must be expended before the material is shipped. There is a certain saving in freight; but this is not nearly equal to X. Call this saving Y.

Now, experience shows that if a gas engineer is quoted a price of 30s. per ton for Dutch bog ore, guaranteed to contain not more than 40 p.ct. moisture, and 30 + X − Y shillings per ton for dry or nearly dry ore, he will invariably buy the 40 p.ct. ore, on the grounds of economy. This means that either the difference in price (*i.e.*, X − Y) is not compared with the saving in quantity, purification space, labour, &c., or else he does definitely prefer a wet oxide, provided, of course, the moisture content is kept within reasonable bounds (*e.g.*, 40 p.ct.).

(*b*) If, as Mr. Thompson states, dry oxide is the best, which I do not accept, then the almost universal system of buying the cheapest oxide must be scrapped, for the ore fields in Holland, lying as they do below sea level, are not easy to drain, and heavy expense in drying is absolutely unavoidable.

Natural oxides from deposits in England, and notably some materials with physical and chemical properties almost identical with Dutch bog ore, and with moisture contents varying from 6 p.ct. to 30 p.ct., are offered, and large quantities are sold to the gas industry by different firms; but it remains to be seen what will be the outcome of Mr. Thompson's very interesting paper.

H. R. HILL.

2, Beeches Walk,
Carshalton, Surrey,
Dec. 17, 1927.

Nuneaton "Gas."

SIR,—No doubt the following circular will be interesting, if not amazing, to all concerned in the gas industry beyond the narrow limits of Nuneaton, in view of Mr. Helps' letter in the current issue of the "JOURNAL."

NUNEATON GAS COMPANY.

NOTICE OF REDUCTION IN PRICE OF GAS.

The Directors of the Nuneaton Gas Company have pleasure in announcing that from the 29th of September last the price of gas will be reduced to the undermentioned rates, which will bring the prices down to those ruling before the coal strike. The Directors hope that this decrease will induce consumers to use more gas, and thus make possible still further reductions in the near future. The new rates are as follows:

Gas Only.	Per Therm.*	Per 1000 C.Ft
	s. d.	s. d.
Prepayment consumers.	1 6·2	3 0·4
Prepayment consumers (with hire-purchase fittings)	1 6·2	3 0·4
Ordinary consumers.	1 6·2	3 0·4
Cooker, domestic consumers (conditional) .	1 3	2 6
Gas fire consumers (conditional)	1 0	2 0
Engine consumers (conditional)	0 9	1 6

* One therm in gas produces as much heat energy as 29 units of electricity $\left(\frac{100{,}000}{3415} = 29{\cdot}2\right)$

Special Prices for Large Quantities.

Slot meters are set to cover cost of gas, meter rent, and fittings on hire.

In the case of slot consumers the meters are at present set at 2s. 5·41d. per therm. The reduced rate is now 1s. 6·2d. per therm, or with meter charges 1s. 8·34d. per therm, or 25 c.ft. for 1d.; so that until the meters are altered, the slot consumers will receive back something like 9d. per therm at the collection.

Further, during the change in the quality of the gas, occupying some months, slot consumers have paid rather more than the correct rate; and this will be refunded to each consumer so soon as the necessary statement is made out, particulars of which will be given to each slot consumer.

GEORGE HELPS,
Engineer and Manager.

Nuneaton Gas Company,
Queen's Road, Nuneaton,
Nov. 14, 1927.

The gas industry will, I have no doubt, be interested in Helps' promised "onslaught" (without any drain on life insurance risks), provided he will concentrate on the above circular.

"ACCOUNTANT."

Dec. 17, 1927.

REGISTER OF PATENTS.

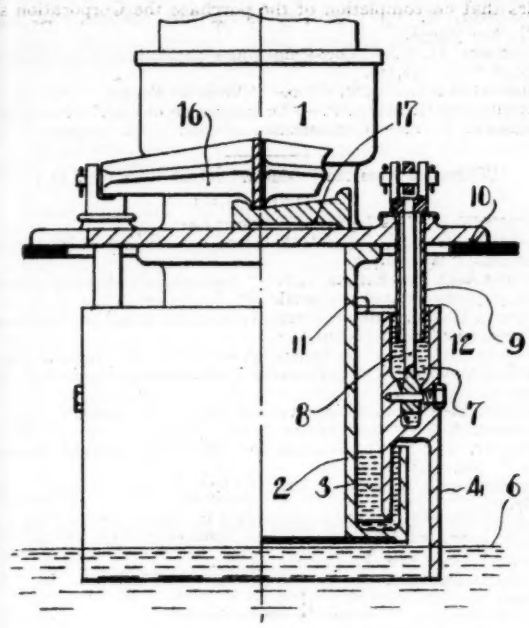
Dip-Pipes for Hydraulic Mains.—No. 269,158.

CIE. GENERALE DE CONSTRUCTION DE FOURS, of Montrouge.

No. 8523; March 28, 1927. Convention date, April 12, 1926.

This invention relates to a design of dip-pipe which obviates the employment of a gland.

The construction will be clearly understood from the following description, referring to the vertical section which we reproduce.



A French Dip-Pipe.

The gases arrive from the retort by the neck 1, which is continued inside the hydraulic main by the tube 2, the lower portion of which is arranged in the form of an external annular trough 3, and the length of which is such that it never dips in the liquid contained in the hydraulic main. The closure is constituted by a movable dipping member 4 formed of two concentric cylinders united at mid-height by a web.

The lower portion of the internal cylinder dips into the trough 3 and constitutes a hydraulic seal, while the lower portion of the external cylinder, which is longer, dips in the liquid of the hydraulic main 6. The annular trough 7, formed by the space comprised between the upper portions of the cylinders, is constantly kept full of liquid. The operating rods 8 are secured at the bottom of this trough. To each of these operating rods corresponds a tube 9 screwed to the cover 10. This tube 9 dips into the water of the trough 7 to a sufficient depth to balance constantly the difference of pressure between that in the enclosure of the hydraulic main and that of the atmosphere.

Each rod 8 passes inside the tube 9 through the cover. The gas-tightness is therefore secured, and at the same time the manipulation of the closure 4 can be performed without any friction or jointed device. The rods pass through the cover freely, in air; and all the mechanism, comprising spindles, pins, studs, &c., are external to the hydraulic main and can be inspected and repaired while working proceeds without creating any opening through which leakages may take place.

The supply of liquid to the seals and to the hydraulic main takes place by overflow of the lower seal, the latter being itself filled by the overflow of the trough 7. In order to be certain to pour all the surplus liquid of the seal towards the inside of the movable piece 4, the internal edge 11 of the trough 7 is lower than the external edge 12. The circular weir so formed can be toothed, interrupted, or assume any shape ensuring a regular flow of liquid.

The operating arrangement of the movable part is constituted by a lever, pivoted on a horizontal axis 15; and its fork-shaped end lifts the heads of the rods 8. The vertical run of the lever is limited at its lower point by a bearing piece 16 butting against a stop of variable height—such as a wedge 17. Any change in the height of the stop under the bearing piece 16, caused, for instance, by the displacement of the wedge 17, entails a change in the amplitude of the displacement of the dipping parts, permitting in this manner the regulation of the depth of dip in a continuous and convenient manner.

Gas Lighting Systems.—No. 279,615.

EVERED & CO., LTD., of Smethwick, and BARNES, F. V., of Todmorden.

No. 24,756; Oct. 6, 1926.

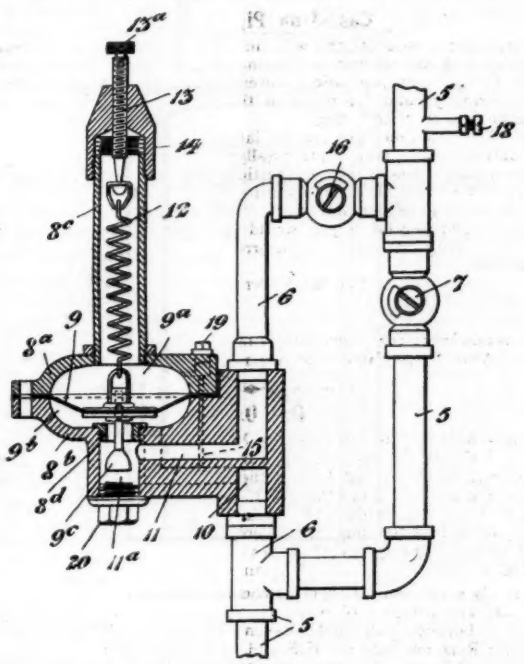
This invention, which relates to the kind of lighting system described in specification No. 260,079 [see "JOURNAL," Vol. 176, p. 500], has for its object to admit of the simultaneous lighting or extinguishing of the whole of a number of lamps, the extinguishing of some of the lamps or groups of lamps, and the subsequent extinguishing of the remainder.

The improved system is characterized by the provision, in conjunction with the by-pass tube, of a governor adapted to maintain a constant difference in pressure between the outlet and the inlet of the governor; the governor co-operating with one or more of the burner control valves, which are adjusted initially so as to permit the passage of gas to the burner or burners at the pressure difference maintained by the governor. Thus the extinguishing of the lamps can be effected in stages as determined by the common control mechanism. The invention also resides in the details of construction of the governor.

The invention will be clear from a description of the working, referring to a part-sectional elevation of the governor and certain of the pipe-lines, which we reproduce.

Assuming that the pressure of gas in the main is 3 in. W.G., the spring 12 connected to the upper side of the flexible diaphragm 9 of the governor is adjusted so that the governor gives an outlet pressure of (say) 1½ in. W.G. The diaphragms of the burner valves of the group of burners required to be extinguished last are weighted so that the valves will remain open when a pressure of only 1½ in. is applied to the upper surface of the diaphragms.

When it is desired to light the whole of the burners of the lamps, the manual control cock 7 in the main by-pass tube is open, and allows the flow of gas at the full main pressure to the upper side of the diaphragms of all the valves, thereby equalizing the pressure on each side of the diaphragms and effecting the opening of the gas passages to all the burners.



Evered's Lighting Control System.

When it is desired to extinguish one group, the control cock 7 is shut off, and thus diverts the gas supply to the control valve or valves by way of the differential governor only, in which event the gas passing from the outlet 11 is supplied at the reduced pressure of 1½ in.; and thus desired lamps will remain alight, whereas groups of burners having the unweighted control valves will be extinguished. When it is desired to extinguish the remaining groups of lamps, the control cock 16 in the section of the auxiliary by-pass 6 intermediate the outlet of the differential governor and the main by-pass tube 5 is turned into the "off" position.

It will be understood that the vents provided in the main by-pass tube and in the cock 16 in the auxiliary by-pass tube admit of the release of pressure in the said tubes.

The specification describes a modification of the invention as applied to clock-controlled systems.

Pressure Recorders.—No. 279,692.

BENNET, J. L., and ALDER & MACKAY, LTD., both of Edinburgh.

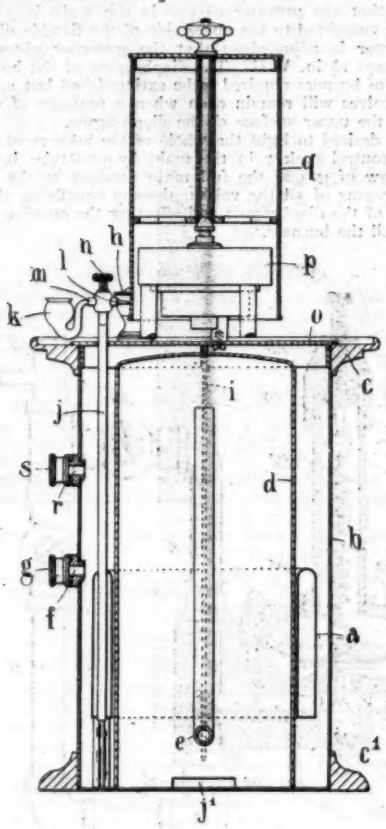
No. 5400; Feb. 25, 1927.

This invention relates to gas pressure recorders such as are customarily used in gas engineers' offices or at points in the distribution area, and more specifically to recorders of the wet hollow float type. At present these are commonly made in a series of different sizes dealing, for instance, with pressures not exceeding 8 in., 12 in., and 20 in. respectively. These all deal with positive pressures. If it is desired to record negative pressures, special apparatus has to be provided.

The object of the present invention is to provide a recorder of the standard type which can be employed for recording both positive and negative pressures.

In the form illustrated, the recording is effected by a movement

dependent on the rise and fall of a float *a* in a cylindrical tank *b*. The tank *b* is constructed of cold rolled brass with turned brass flanges *c* and c^1 at top and bottom respectively. The tank *b* contains an inner case *d* of rolled brass soldered at the foot after insertion of an inlet pipe *e*. A water level adjustment orifice *f*, with screwed cap *g* and a filling aperture with screwed plug *h* are also provided. The float *a* comprises a hollow drum freely moving between the tank *b* and inner case *d*, but guided to prevent rotation by means of two guides of which one is indicated marked *i*. The float *a* may be made of rolled brass. It is balanced, and carries a pen spindle *j*. The tank *b* is in communication with the inner case *d* by way of an opening j^1 in the case *d*. The pen is of glass, and is provided with an ink vessel *k* terminating in a tube *l* with fine orifice. It is cemented into a small metal sheath *m* which in turn is fixed into the pen-holder by a small set screw *n*. The tank is provided with a cover *o* through which the pen-holder *j* projects. On this cover *o* is mounted a time-piece movement, indicated by *p*, with cylindrical chart carrier *q*.



An "A. & M." Pressure Recorder.

This represents the ordinary wet hollow float gas pressure register as supplied by Alder & Mackay, Ltd., of Edinburgh.

According to the invention, an additional water line determining aperture *r* with screwed cap *s* is provided in the side of the tank *b*. The position of this aperture is so chosen that the recorder can be used for purposes such as those referred to herein. According to one example, with the centre of the lower aperture *f* about 4¼ in. above the base of the tank, the centre of the upper aperture *r* is about 6½ in. above the base.

In operation, when it is desired to use the apparatus as a gas pressure recorder as at present, the upper of the two water level control apertures, namely *r*, is left sealed by the screwed cap *s*, and the water level is adjusted by removing the cap *g* from the lower aperture *f* and by filling in water until it overflows at this aperture. Should it subsequently be desired to employ the recorder to deal with negative pressures, the bottom water level cap *g* is left in position, and the top water level cap *s* removed. Water is then filled into the tank until it overflows through the orifice *r*.

By this means an apparatus which is only commonly available for recording positive pressures from 0 to 8 in. for example, as modified can be employed for recording pressures from −4 to +4 in.

Rust Prevention in Gasholders.—No. 280,134.

FLETCHER, J. A., and NORMAN, C. R., both of Stalybridge.

No. 16,855; June 24, 1927.

This invention has for its object to provide improved means for the prevention or minimization of the rusting and corrosion of the metal of gasholders, due to the sealing liquid.

In accordance with the invention, the liquid is in the form of an oil emulsion produced by intimately mixing soluble oil or a mixture of soluble oils with water. The oil may be in solid or liquid form. Preferably, it is a mixture of animal, vegetable, and mineral oils in the emulsion. The latter serves to protect the metal against corrosion. A convenient mixture may comprise cotton seed oil, mineral oil (of 0·885 to 0·902 sp. gr.), fish oil, and ammonia solution. The mixture is prepared by rapid and violent stirring or agitation, and is mixed with water.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Dec. 7.]

Nos. 31,918—32,712.

BARRETT COMPANY.—"Distillation of tar." No. 31,951.
COOKE, F.—"Distillation of coal." No. 32,502.
GORDON, K.—"Hydrogenation of carbonaceous materials." No. 32,543.
HUBSCH, M. G.—"Process for removal of phenols from tars." No. 32,029.
HUMPHREY, H. A.—"Hydrogenation of carbonaceous materials." No. 32,237.
HUMPHREY, H. A.—"Recovery of oils from carbonaceous material." No. 32,238.
HUMPHREY, H. A.—"Low-temperature distillation of carbonaceous materials." No. 32,239.
HUMPHREYS & GLASGOW, LTD.—"Valves for liquids." No. 32,126.
PEIRSON, A. H. and A. P.—"Carbonization of coal." No. 32,599.
WHEELER, R. V.—"Carbonization of coal." No. 32,599.

[Extracted from the "Official Journal" for Dec. 14.]

Nos. 32,713—33,501.

BANSEN, H.—"Gas burners." No. 32,840.
BLAKEBOROUGH, R. A.—"Air-escape valves for high-pressure mains, &c." No. 32,737.
BRITISH ARCA REGULATORS, LTD.—"Automatically dividing quantity of gas in predetermined proportions." No. 33,266.
CHAMBER OVENS, LTD. (PINTSCH & DR. OTTO GES.).—"Carbonization apparatus." No. 33,091.
CRANSTON, W. M.—"Carbonization of coal." No. 32,801.
DUCKHAM, A. M.—"Apparatus for grading solid materials." No. 33,239.
DUPONT, L.—"Carbonizing oven for fuel." No. 32,966.
FALKNER, A. J.—"Gas burners." Nos. 33,006, 33,007, 33,008.
GREGORY, H. S.—"Automatically controlling lighting of street lamps." No. 33,387.
HUMPHREYS & GLASGOW, LTD.—"Manufacture of gas." No. 32,967.
LEE, F. C.—"Drying and purification of coal gas." No. 33,305.
LINDSAY, T.—See British Arca Regulators, Ltd. No. 33,266.
SLATE, J.—See Lee, F. C. No. 33,305.
WOODALL-DUCKHAM (1920), LTD.—See Duckham, A. M. No. 33,239.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Wallasey Corporation Bill: Returned from the Commons, agreed to, with amendments.

Beverley, Calverley and Horsforth, Dewsbury, Neyland, and Peterborough Gas Orders: Agreed to.

Newhaven Gas Order.

On Dec. 14, the Special Orders Committee reported that they had examined the Special Order, and that a petition against it had been presented by the Trustees of the Newhaven Harbour and Ouse Lower Navigation. A report from the Board of Trade upon the Order had been considered; and the Committee were of opinion that there was no necessity for a further inquiry by a Select Committee.

HOUSE OF COMMONS.

Progress of Bills.

Wallasey Corporation Bill: As amended, considered; read the third time and passed, with amendments.

Beverley, Calverley and Horsforth, Dewsbury, Neyland, and Peterborough Gas Orders: Approved.

Scientific and Industrial Research.

A copy of the report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1926-27 was presented to the House on Dec. 15.

Bergius Process of Oil Extraction.

On Monday, Dec. 12, Col. DAY asked the President of the Board of Education whether it was intended to publish the results of the investigations that had been made at the Fuel Research Station on the Bergius process for the extraction of oil from coal; and whether any English systems for the foregoing purpose had been investigated.

The DUCHESS OF ATHOLL, the Parliamentary Secretary to the Board of Education, stated that the question of publication of the results hitherto obtained at the Fuel Research Station, Greenwich, was now under consideration, but that publication would probably be delayed until the investigations had been further advanced. No English process for the conversion of coal into oil by hydrogenation had been brought to the notice of the Fuel Research Board. Regarding low-temperature carbonization, besides the work undertaken at the Fuel Research Station, investigations had been conducted into, and reports had been published on, the following English processes: The "Parker" plant at Barugh; Midland Coal Products, Ltd., plant at Netherfield; "Fusion" rotary retort; "Freeman" multiple retort of the British Oil and Fuel Conservation, Ltd.; and the "Crozier" retort. The report on the last-mentioned was now in the Press.

MISCELLANEOUS NEWS.

LEEDS UNIVERSITY LECTURES.

Department of Coal Gas and Fuel Industries with Metallurgy.—Programme of Special Courses for Session 1927-28.

In connection with the work of the Department, arrangements have been made for the delivery, during the second term of the session, of the following special courses of evening lectures.

I.—The Manufacture of Coal Gas.

Mr. RHEAD and Mr. HOLLINGS.

A course of twelve lectures divided into two sections, A and B, will be given on Fridays during the second term.

A. Carbonization Practice.

This section will be given by Mr. T. F. E. Rhead, M.Sc., A.I.C., Chief Chemist, City of Birmingham Gas Department. It will consist of six lectures given at 6 p.m. and 7.30 p.m. on Fridays, commencing Jan. 20 and concluding Feb. 3, 1928.

SYLLABUS.

Gas-making coals and their behaviour when carbonized. Construction (including ironwork) of horizontal and inclined retorts, intermittent and continuous vertical retorts, chamber and coke ovens, water gas and complete gasification plants. Refractories and their effect on design. Heating of retorts, external and internal producers. Recovery of waste heat. Comparison of nature and yields of solid, liquid, and gaseous products from the various types of gas-making plants. Thermal and economic efficiencies. Factors affecting design of plant, processes, and composition of crude gas. Mechanical handling of coal and coke. Testing coals in the laboratory and on the large scale. High and low temperature carbonization in relation to production of solid smokeless fuel. The 1920 Gas Regulation Act and recent progress in carbonizing methods.

B. Gas Purification Practice.

This section will be given by Mr. H. Hollings, M.Sc., A.I.C., Chief Gas Chemist, Gas Light and Coke Company. It will consist of six lectures given at 6 p.m. and 7.30 p.m., commencing Feb. 10 and concluding Feb. 24, 1928.

SYLLABUS.

Nature of the impurities in crude coal gas, and the factors affecting their formation. General outline of purification processes. The principles of cooling and condensation. The function, design, and operation of air and water cooled condensers, tar fog extractors, &c. The electrical precipitation of tar. The principles of ammonia extraction. The constitution of ammoniacal liquor. The design and operation of washers and scrubbers. The direct recovery of ammonia. The simultaneous removal of ammonia and hydrogen sulphide. The removal of cyanogen. The removal of hydrogen sulphide, with special reference to processes making use of oxide of iron. The design and operation of oxide of iron purifiers. The selection and preparation of oxides of iron. The removal of carbon bisulphide and naphthalene. The recovery of benzole. The contamination of gas on storage. The drying of coal gas.

FEE for this course: Sections A and B, £1; For either section taken separately, 12s. 6d. each.

Ia.—Waste Heat Recovery in Carbonization Industries.

Dr. PARKER.

Four lectures will be given by A. Parker, D.Sc., F.I.C., M.I.Chem.E., Research Chemist to the Joint Research Committee of the Institution of Gas Engineers and the University of Leeds, at 6 p.m. and 7.30 p.m. on Tuesday, Feb. 28, and March 6, 1928.

SYLLABUS.

The sources of waste heat available in typical processes employed in the gas and coke industries. Principles of calculation of amounts of waste heat. Methods and plant employed in utilization. Results of typical tests of plant, and resultant fuel economy.

II.—Refractory Materials.

Prof. COBB.

A course of eight lectures will be given by Prof. J. W. Cobb, C.B.E., B.Sc., F.I.C., of Leeds University, on Tuesdays at 6 p.m. and 7.30 p.m., commencing Jan. 24 and concluding Feb. 14, 1928.

SYLLABUS.

Physical and chemical principles on which the manufacture and use of refractory materials are based. Consideration of raw materials available and manufacturing processes. Choice of refractory materials for use in furnaces of different types. Methods of testing.

III.—Metallurgy.

Mr. SUMMERS.

A course of six lectures on the microscopic study of engineering alloys, followed by practical work in the laboratory, will be given by Mr. P. F. Summers, A.R.S.M., on Wednesdays, at 6 p.m., commencing Jan. 18 and concluding Feb. 22, 1928. The course will be divided into two parts, which may be taken separately, though all intending students are expected to enrol on Jan. 18.

PART 1. *General* (3 lectures with laboratory work):

An introduction to the metallographic study of metals and alloys, their preparation and examination. The composition and uses of various engineering alloys.

PART 2. *Special* (3 lectures with laboratory work):

The microstructure, heat treatment, and other properties of alloys of copper, tin, and nickel.

FEE for each part (including laboratory work), 7s. 6d.

IV.—Evening Laboratory Course.

Prof. COBB, Mr. HODSMAN, and Mr. SUMMERS.

The laboratory of the Department will be open on Wednesday evenings between 6 p.m. and 9 p.m. from Jan. 18 to Feb. 22, 1928, for a limited number of students who have already received some chemical training, but who desire instruction in fuel calorimetry and pyrometry. More advanced students, capable of independent work, may also be admitted to the laboratory during these periods.

The earliest possible application from intending students is requested.

FEE, 15s.

V.—Day Lecture Courses.

For information respecting the day lecture courses in the Coal Gas and Fuel Industries Department of the University—namely, in

Properties of Gases;
Technology of Fuel;
General and Non-Ferrous Metallurgy;
Iron and Steel;
Alloys and Metallography—

see the special prospectus of the Department, obtainable on application to the Registrar.

Admission of Students, Inquiries, &c.

Intending students are requested to send in their names without delay to the Registrar of the University, specifying at the same time what course or courses they wish to attend. Other inquiries regarding the courses should be addressed to Prof. Cobb, the Head of the Department of Coal Gas and Fuel Industries (with Metallurgy).

The University reserves the right to decide that any course shall not be given if the number of entries is inadequate.

In view of the demands on the University accommodation, the earliest possible application for admission to the day courses commencing October, 1928, is advisable.

The fees for the respective courses are payable in advance on the date of the first lecture.

LONG SERVICE RECOGNIZED AT MORECAMBE.

On Saturday last, at the Royal Hotel, Morecambe, the staff and employees of the Corporation Gas Department assembled to recognize the retirement of Mr. Walter Hodgson, after 51 years' continuous employment with the gas undertaking in various capacities. The chair was occupied by Mr. W. Simpson (Chairman of the Works Social Club), and he was supported by Councillor J. C. Wilson (Chairman of the Gas Committee), Mr. T. A. Barratt, Gas Engineer, and others.

Mr. BARRATT, in presenting Mr. Hodgson with a handsome settee and an umbrella, and handing him a handbag and umbrella for his wife, said it afforded him great pleasure to testify to the long and honourable services and the winning personality of their old friend. He got his first job with the Morecambe Gas Company in 1876, and might have retired on a pension when the Corporation acquired the concern, though he preferred not to do so. During his career he had served under various engineers, including Mr. James Duff (Banbury), Mr. Blakey (deceased), Mr. Armitage (British Gas Light Company), Mr. H. Clapham, Mr. Ruthven (Ramsgate), and the speaker. Communications had been received from Messrs. Duff, Armitage, Clapham, and Ruthven bearing eloquent testimony to Mr. Hodgson's worth, and extending best wishes for his future happiness.

Mr. HODGSON, in acknowledging the presentations, said he would always look back on the happy years he had spent with them; his association with some of them present extending over thirty years.

Responding to the toast of his health, Mr. BARRATT expressed his confidence in his staff. It was the spirit of team work which had helped the Morecambe undertaking along the line of progress they had experienced in recent years.

Councillor WILSON also acknowledged the loyalty of the staff.

TORONTO CONSUMERS' GAS COMPANY.

The Seventy-Ninth Annual General Meeting of the Company was presided over by Mr. A. W. Austin, who presented the report and financial statement for the year ended Sept. 30.

The sales of gas during the year were the largest in the history of the Company. On Sept. 26 a total volume of 19,290,000 c.ft. was distributed, constituting a record output for a single day. There were 155,730 meters connected to the Company's distribution system at the close of the year, a net gain of 3946. Industrial gas sales during the year increased about 15 p.ct. An additional unit of Glover-West vertical retorts has been installed at Station "A," and incorporated with the eight settings previously erected, forming one complete battery of nine settings. No auxiliary equipment was necessary for the additional manufacturing capacity provided by this extension. Four new purifiers, having a daily capacity of 4,000,000 c.ft., have been constructed for the coal gas plant at Station "A," replacing four old boxes which had been in continuous service since 1899. The installation at the manufacturing stations of the necessary pumping equipment for the medium high-pressure system of gas distribution has been completed; and the system was put into operation last April.

The adoption of the report was moved by the President, and seconded by Dr. F. LeM. Grasett (the Vice-President), who remarked that the Company were the first in the British Empire to erect a waterless holder.

Mr. Arthur Hewitt (the General Manager) declared that the quality and extent of the service now rendered to consumers was better and greater than at any previous time in the history of the Company.

PROPOSED EXTENSION OF THE ALKALI ACT.

At the Ministry of Health, on Wednesday, Dec. 14, Dr. T. L. BAILEY (Chief Inspector of Alkali Works) held a public inquiry into a proposed extension of the Alkali, &c., Works Regulation Act, 1906, (*a*) extending the list of noxious or offensive gases mentioned in section 27 of the Act of 1906, and (*b*) extending the list of works mentioned in the first schedule of the Act of 1906. When the inquiry opened very few people were present; and, as a matter of fact, there were no objections to the draft Order.

Dr. BAILEY therefore went through the draft Order, and explained the reasons which have prompted the Ministry of Health in the matter. In the first place, he said that there had been some misapprehension as to whether the Order applied to Scotland; and he stated definitely that it did not. There had also, he said, been a little misapprehension, judging from the correspondence received, in regard to the meaning of the term "noxious gases." It seemed to be imagined by some people that because certain noxious gases were mentioned in the draft Order, therefore all processes evolving these noxious gases could automatically come under inspection; but this was not so. Processes involving the evolution of these noxious gases might come under inspection some day; but at present there was only power to inspect those works which were definitely specified in the schedule of works.

Mr. W. J. U. WOOLCOCK stated, on behalf of the Association of British Chemical Manufacturers, that he offered no objection to the draft Order.

Mr. E. J. FOTTRELL, representing the National Gas Council, said he also offered no objection.

Dr. W. H. COLMAN, for the National Benzole Association, said he would like some definition of the word "fumes" as used in the draft Order—especially in regard to benzene works.

Dr. BAILEY said the fumes from benzene works were very much in the same category as fumes from tar works. Fumes which were definitely noxious and dangerous to health and a nuisance, which might be evolved in the process—such, for instance, as sulphuretted hydrogen—would come within the draft Order. He presumed Dr. Colman was referring specially to benzole works.

Dr. COLMAN replied that he was.

Dr. BAILEY said that benzene was distinctly noxious; but, of course, anyone preparing benzene would not allow it to go into the air, and that fact, therefore, automatically wiped it out as a noxious gas.

Dr. COLMAN said this relieved his anxiety on the point; but at the same time he would have liked something more definite than the word "fumes" in the draft Order. Things were all right at present; but at some future time there might be somebody in Dr. Bailey's position who would be less liberal in his interpretation of the word. For instance, in refining benzole, it was possible that a trace of benzene might escape, although everything was closed. It was very difficult to prevent a slight trace of benzene fumes being noticeable. In these circumstances, the word "fumes" seemed rather an omnibus expression, which might cover everything, even though such a case as he had mentioned was not intended to be covered in the ordinary way.

Dr. BAILEY said it must, of course, be understood that the fumes emitted were only those which were dangerous to health or a nuisance.

Dr. COLMAN remarked that if that was the meaning of the word, then his objection was met.

Dr. BAILEY added that the intention of the draft Order, and of the Act, was merely to deal with noxious gases or fumes which were a danger to public health and a nuisance. Obviously, if they were not, they would not have to be dealt with. When making reference subsequently to nitric acid works, he remarked that the Department did not propose to be vindictive in any way, or to insist upon regulations which imposed excessive difficulties upon manufacturers. The work of his Department had never been based upon anything of that kind, and never would be. He then went through the draft Order in detail.

The following are among the additions to the list of gases and fumes to be included within the expression "noxious or offensive gas" in the Act of 1906:

Sulphuric anhydride.
Sulphurous anhydride (except that arising solely from the combustion of coal).
Ammonia.
Pyridine.
Fumes from benzene works.

The proposed extended descriptions of certain works scheduled in the Act of 1906 include tar works, in regard to which the words to be added to the description appearing in the first schedule are: "And works in which creosote or any other product of the distillation of gas tar or coal tar is distilled or is heated in any manufacturing operation involving the evolution of any noxious or offensive gas."

Dr. BAILEY explained that the action in this respect had been taken because there had been serious complaints owing to fumes evolved from the mixing of dehydrated tar and pitch. It was quite easy to get rid of that nuisance; and in one or two cases inspectors had made suggestions which had removed the trouble. This could probably be done by altering the method of mixing. Some people liked to mix with a current of air; and if that were done with hot materials, there would naturally be a tremendous evolution of fumes, which would carry a long way, and the smell was not at all pleasant. By passing these fumes through a scrubber, the whole nuisance had been stopped; and the aim was to stop a nuisance by as simple a means as possible. Where means were not practicable, they could not be employed. It would be useless saying that a firm must spend an enormous amount of money which would have the effect of preventing them carrying on a process at all.

Mr. WOOLCOCK asked Dr. Bailey to make some reference to the creosoting of timber, because that was a matter with which some tar distillers were concerned.

Dr. BAILEY replied that this question arose on the use of the words "is heated" in the addition, under the heading of tar works. Mr. Woolcock had written to him asking whether a works where timber was creosoted would be regarded as a tar works; and the answer was "No." It would not be a manufacturing process within the meaning of the description; and the creosoting of timber would not be considered noxious.

The final part of the draft Order gives a list of works to be added to the list already included in the Act of 1906, which at present numbers 21 works. Four additions are proposed, two of which are:

22.—Benzene works—that is to say, works (not being tar works as already defined) in which any wash oil used for the scrubbing of coal gas is distilled, or in which any crude benzole is distilled.

23.—Pyridine works—that is to say, works in which pyridine is recovered.

Dr. BAILEY said that benzene works would include processes from which such gases as sulphuretted hydrogen and other sulphur compounds would be evolved. As regards pyridine works, he had had quite serious complaints against a tar works in this respect; and all sorts of things had been done to get over the trouble. One thing done was to attend to the pitch coolers and the pitch bags; but still complaints came from the outside public. Curiously enough, having removed all other sources of complaint and reduced the emission to pyridine fumes, he found he had no jurisdiction, and all that could be done was to put it up to the manufacturer to abate the nuisance, which he had done to a certain extent. Pyridine was persistent; and one could not hope to get rid of it absolutely; but it could be reduced to a minimum quite simply, and that was the object of including pyridine works.

GOSPORT AND DISTRICT GAS COMPANY'S INQUIRY.

At the Thorngate Hall, Gosport, on Dec. 8, Mr. JAMES F. RONCA, Gas Administrator to the Board of Trade, held an inquiry into the application of the Gosport and District Gas Company for a Special Order under section 10 of the Gas Regulation Act, empowering them to raise further capital and to construct additional works for the purposes of the undertaking.

Objections had been lodged by the local authorities of Gosport and Fareham, and by the owners and tenants of properties in the vicinity of the proposed works; but at the outset Mr. LEONARD BLAKE (of Messrs. Blake, Lapthorn, & Roberts), representing the Gosport Borough Council, stated that the objection of that authority had been met. It was based purely on the ground that the amount of capital being asked for was more than was reasonably necessary, but the Company had now offered to reduce the figure from £80,000 to £66,000, which would cause a consequential reduction of £7000 in the borrowing powers—a total reduction of £21,000. The Gosport Council had decided to accept that offer as being a reasonable method of meeting their objection, which was accordingly withdrawn.

Mr. H. F. BIDDER, Barrister-at-Law (instructed by Messrs. Churcher & Churcher, Gosport, Solicitors to the Company), appeared to promote the Draft Special Order. He stated that the Gosport and District Gas Company was formed in 1835; the works at that date being situated on part of the site of the present works. The Company first got statutory powers in 1865, and they came again in 1873 for an increase of charges. Then came a long pause without any application of any sort until the Gosport Gas Act, 1908, the most important provision of which was to authorize the Company to construct works on a further portion of the present site. The next application was in 1923 for a Charges Order, when the Company obtained the powers of charging which were now in force; and in the following year they applied for the Gosport and District Gas Order, 1924, by which they were authorized to take over the Fareham undertaking.

That the Company had done their work well was shown by the great increase of their business and by the charges made. At the moment, the actual price of gas in Gosport was 10·8d. per therm, which worked out at 3s. 7·2d. per 1000 c.ft. There was a differential charge under the Order by which they took over the Fareham undertaking, which made the Fareham price 13d. per therm, equivalent to 4s. 4d. per 1000 c.ft. In 1923, the annual consumption was approximately 210½ million c.ft. In 1924, when Fareham was taken over, its figures became 240 millions. In 1925, the figure became 259 millions, and in 1926, the year of the coal strike, when gas consumption tended to go up abnormally, it became 298¾ millions—an increase of 15 p.ct. The figures they had got for the first nine months of 1927 indicated a further increase of 8 p.ct.; and if this was maintained, it would give a figure for the present year of (say) 322 millions. In 1924, the maximum day output, which was the test of the plant required, was 835,000 c.ft.; in 1925, 1,193,000; in 1926, 1,244,000; and adding 8 p.ct. would give a figure for 1927 of 1,350,000. The carbonizing plant had a daily capacity of 1,125,000 c.ft., and the water

gas plant a capacity of 950,000 c.ft.; but half the latter had to be allowed as stand-by, so that its dependable capacity was about 500,000. The actual dependable capacity, therefore, of the whole plant as it stood to-day was 1,625,000 c.ft.

With an increase of something over 100,000 c.ft. a year, they were left with a bare margin of three years. The water gas plant must be re-arranged at once, and a third unit of 500,000 c.ft. would probably be installed. This would add a capacity of 500,000 c.ft., because one-third stand-by would then be sufficient, and they would get a total capacity of something over 2 million c.ft. Even this, at the present rate of increase, would only be good for five or six years. On the new site they were asking for they would be able to erect new carbonizing plant when the time came—this would not be in the next year or two—which would give a total capacity at the works of 3 millions a day.

Turning to the capital proposals, Mr. Bidder pointed out that the total unexercised capital powers of the Company amounted to £13,901—namely, £3151 remaining to be issued as ordinary capital, and £10,750 remaining to be borrowed. The capital account, however, had been overspent by £10,112, leaving the capital in hand at the moment something under £4000. They were now asking for additional ordinary capital of £66,000, and power to borrow in respect of both existing and new capital at half the value of the issued capital. This came out as follows: Additional ordinary capital, £66,000; increased borrowing powers in respect of existing capital, £29,230; the same in respect of the additional capital, £33,000—a total of £128,230. Adding to this the balance between the present unexercised powers and the amount overspent on the capital account, they would get net available capital powers, if the Order was passed, of £132,000.

Mr. Bidder proceeded to indicate roughly what the necessary development of the undertaking would cost. The works mentioned were: Gasholder, 1 million c.ft. capacity, including foundations (£20,000); telpher coke handling plant (in since December, 1926); carbonizing plant extension, third unit (already accounted for in capacity given); reconstructing carburetted water-gas plant (£19,500); gasholder and foundations, Fareham Works; gasholder and foundations, Lee-on-Solent; special new mains and services for building sites developments; stores; governor house and station governors; branch office, Lee-on-Solent; ordinary mains and services, meters, &c. With the amount required to adjust the capital account, the total required was £144,000.

Describing the site for which they were seeking powers to construct works, Mr. Bidder stated that it was bounded on the southern side by Mayfield Road and on the west side by some few houses, the fronts of which were in Woodstock Road. It offered as convenient a scheme for extension as could be imagined.

Mr. W. G. ELMS, who appeared for the Trustees of the Dolman Estate, as well as for Mr. J. R. Hailstone and other objectors in Mayfield Road, stated that the objection of the Dolman Trustees had been withdrawn by agreement.

Mr. BIDDER said that what they had settled with Mr. Elms was that no carbonizing plant or works for the manufacture or conversion of residuals was to be erected within 100 ft. of the southern boundary of the land scheduled in the Draft Order. This meant that such works could not be erected within 100 ft. of the back gardens of the houses in Mayfield Road.

Mr. RONCA asked whether it was intended that this should go into the Order.

Mr. BIDDER replied that it would be an agreement between the Company and the Dolman Trustees. They did not mind it going into the Order, but there was no difficulty about making it effective.

Turning to the other objections, Mr. Bidder stated that that of the Fareham Rural District Council had also been withdrawn, and in the absence of other objectors they were left with the petitions of Mr. Hailstone and the residents in Mayfield Road, and of Mr. Arthur Harvey. The grounds of objection of the residents in Mayfield Road were that the smell from the present works was often very objectionable, that the noise was almost continuous, and that there were smoke, the shutting-out of light and air by large buildings, and the danger of large gas storage. His comment on this was a general one—that the Gas Company had every desire to live as comfortably with their neighbours as possible; and though they had been there for 92 years this was the first time that they had had any complaint that their works were being conducted in a way that was offensive to their neighbours. It was no doubt due to a desire on the part of the objectors to have a green field behind their garden walls, instead of industrial buildings. The owners or tenants of these houses had no right to insist upon any particular method of treating this field, apart from the law of nuisance. There might be localities of such a character for beauty or romantic scenery where the Board would hesitate to grant an application for the construction of works; but here they had a site adjoining a gas-works, which was there long before the houses.

Mr. Bidder added that his comments applied equally to the objection of Mr. Arthur Harvey, the owner of the properties in Woodstock Road, who complained that the erection of gas-works would be extremely detrimental to the neighbourhood, owing to the noise and unpleasant odours.

Mr. *Arthur Valon* (Consulting Engineer) confirmed figures quoted by Counsel, and gave other technical details regarding the plant and the necessity for extension. He added that the land upon which the works now stood amounted to 4½ acres, and the land they were proposing to acquire was just over a further 4½ acres. The Company could not comfortably reach an output of 3 millions a day on less than this nine acres, but the latter would not limit them to the manufacture of 3 millions. If they had to go farther away, it would mean very heavy expense and probably a considerable increase in the price of gas.

Mr. HARVEY asked whether the Company would guarantee that there would be no obnoxious fumes or noise from the new buildings which would tend to depreciate the value of adjoining property.

Mr. *Valon* pointed out that if a nuisance was created, proceedings could be taken against the Company.

Mr. HAILSTONE complained of the noise from the unloading of coal barges at night, and said that the duplicating of the machinery would make it considerably worse. He also asked whether the 100 ft. referred to in the agreement was to be utilized for dumping refuse, which would create a worse smell than that coming from the buildings.

Mr. *Valon* replied that the unloading of coal at night arose during the coal strike, and would be done as little as possible. They had no intention of dumping refuse on the 100 ft. of land referred to.

Mr. ELMS asked whether the agreement precluded the erection of purifying plant, which, he said, was the most objectionable part of the works, but Mr. Bidder submitted that as the objection of the Dolman Trustees had been withdrawn, Mr. Elms had no *locus standi*. The wording of the agreement had been decided upon by the parties concerned, and its subsequent interpretation was for the Courts to consider.

Mr. RONCA afterwards visited the site; and the inquiry closed.

COLONIAL GAS ASSOCIATION, LTD.

The Thirty-Ninth Annual Meeting of the Association was held in Melbourne on Oct. 5—Mr. P. C. HOLMES HUNT, M.Inst.C.E. (Chairman of Directors), presiding.

The CHAIRMAN said that there had been an increase in the total revenue of £37,000. The quantity of gas sold, which figure excluded the amount sold by their Subsidiary Companies in New South Wales, was 554,355,000 c.ft.—an increase of 17·8 p.ct. on the quantity sold for the year ended June 30, 1926. Allowing for interest charges, and interim dividends paid in April last (the latter item amounting to £23,473), the amount available for final dividend was £46,779, compared with £39,882—an increase of nearly £7000. During the year they had connected nearly 2800 new consumers at their various stations; and new consumers continued to be connected-up at about the same rate. The new Glover-West carbonizing plant at the Footscray Works had given most satisfactory results during the twelve months. It was believed that the plant had yielded during that period the best all-round results yet produced from Maitland coal. Their recognition of the "service relation" which existed between a public utility and its consumers was stronger to-day than at any stage in the Association's history, and he believed the customers' appreciation of what they were doing was higher also. This had been accomplished by several means, not the least important of which were the cookery demonstrations. At a conservative estimate, the attendances at these demonstrations, which had been held within the suburbs of Melbourne, and in country centres, had totalled 10,000 in twelve months.

Mr. J. S. WEIR seconded the motion for the adoption of the balance-sheet, which was carried unanimously.

The CHAIRMAN then moved that a dividend at the rate of 8 p.ct. per annum (less interim dividend of 4 p.ct. for the half-year ended Dec. 31, 1926) be paid on the preference shares; that a dividend at the rate of 9 p.ct. per annum (less interim dividend of 4½ p.ct. for the half-year ended Dec. 31, 1926) be paid on the ordinary shares; that £3000 be added to the reserve fund; that £8000 be set aside for Australian income-taxes on profits earned to June 30; and that the balance be carried forward to the next account.

Sir ARTHUR ROBINSON, K.C.M.G., seconded this resolution, which was carried unanimously.

TRADE NOTES.

Carbonizing Plant for Dewsbury.

The Dewsbury Corporation have placed the contract for a new retort house and carbonizing plant, together with coke grading apparatus and hoppers, at their Savile town Gas-Works with Messrs. Gibbons Brothers, of Dudley.

Dry Cleaning of Coal.

In a pamphlet, Messrs. R. H. Kirkup & Co., of Gateshead-on-Tyne, describe their stationary table for the dry cleaning of coal. Many advantages are claimed for the process, including the facts that the material to be treated has not to be graded, thus eliminating the expense of screens and their upkeep; the initial cost is low; and coal can be treated from 2 in. to 9 in. in one operation. The Kirkup plant is an entirely British patent, and is manufactured in Gateshead.

EXTENSIONS.

Bradford Gas-Works.

Three schemes for improvement of gas service have been submitted by the Bradford City Gas Engineer (Mr. E. J. Sutcliffe) to his Committee, and are estimated to cost £80,000. The Birkshall Works have thoroughly up-to-date retort house plant; but the purifying capacity is not equal to that of gas production, and it is proposed to instal additional purifiers to make-up this deficiency, at a cost of some £25,000 A new main is required between the Birkshall and the Valley Road Works, and will cost £15,000. Carburetted water gas plant is estimated to cost £30,000; and the remaining £10,000 is the calculated cost of incidentals. The Valley Road Works are of old pattern, with high labour cost; and it is expected that a big scheme there will have to follow the proposed expenditure on making Birkshall, in conjunction with Mill Street and Thornton Road, capable of taking the whole load while the Valley Road Works are under reconstruction. The Valley Road scheme, however, is not immediately under consideration.

GAS REGULATION ACT APPLICATIONS.

DECLARATION OF CALORIFIC VALUE.

Conway Corporation.—400 B.Th.U., as from March 13, 1928.

SPECIAL ORDER.

Ormskirk District Gas Company.

To empower the Company to use scheduled lands for gas purposes; to reduce the maximum price and authorize a differential charge; and to confer general powers upon the Company.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market is quiet, and little new business passing; terms having been mostly arranged in view of the approaching holidays. Prices are firm for prompt; but bookings for January are slow, and buyers are hesitating in the hope of price concessions. An interesting item of news this week has been the raising of the French embargo on coal imports which was imposed last May, under which licences were required for shipments of coal into France. There has never actually been much difficulty in obtaining permits; but the existence of the restriction was detrimental to the arranging of contracts, and Durham, which is normally a large exporter to France, is hoping to benefit from its removal.

Durham coking coal has been the firmest feature in the past week, and 14s. to 14s. 3d. f.o.b. has been obtained for best qualities for early shipment. Quoted prices for the whole of next year are round 13s. 6d. Wear Special gas makes quote 16s. to 16s. 3d. f.o.b., and 15s. 9d. is asked for best qualities. These are in a fairly good position; but seconds are plentiful, and none too firm at 13s. 6d. to 14s. nominal. Durham unscreened steams are 14s. 6d. to 15s. 6d. for best makes, and 13s. 6d. to 13s. 9d. for seconds and others. Northumberland steams are fairly steady for prompt, at 14s. for best screened sorts.

The demand for gas coke has slightly eased off, though 23s. to 24s. f.o.b. is still asked for shipment.

YORKSHIRE AND LANCASHIRE.

The colder weather and the approach of the holidays have contributed to an increase in the demand for domestic fuel, but with accumulated stocks there is no material alteration in the working hours of collieries.

Many industrial contracts are expiring at the end of the month, and renewal prices vary considerably. Some of the better grade fuels have stiffened in value, while others are being sold at recent figures. There is room for considerable improvement in this section of the trade.

The export feeling is a little better, but no material quantities are involved.

Gas concerns are now taking their maximum tonnage; but with the present condition of trade in other directions they have no difficulty in securing all they require.

The following are the Humber bunker and export prices f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 16s. 3d.; screened gas coal, 16s. to 17s.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. 9d. to 16s.; washed singles, 15s. 9d. to 16s.; washed smalls, 11s. 6d. to 12s.; rough slack, 8s. 9d. to 9s.; smithy peas, 17s. to 18s. per ton. West Yorkshire—Hartleys (f.o.b. Goole), 14s. 6d. to 16s.; screened gas coal, 15s. to 16s.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. 6d. to 15s. 9d.; washed singles, 15s. to 15s. 6d.; washed smalls, 11s. 6d. to 12s.; unwashed trebles, 15s. 9d. to 16s.; unwashed doubles, 11s. 6d. to 12s.; coking smalls, 9s. to 9s. 3d. per ton. Derbyshire and Nottinghamshire—Top hards, 16s. to 17s. 6d; washed doubles, 15s. 9d. to 16s.; washed singles, 15s. 3d. to 15s. 9d.; washed smalls, 11s. to 12s.; unwashed doubles, 12s. to 12s. 6d.; rough slack, 9s. 9d. to 10s. per ton. Yorkshire, Derbyshire, Nottinghamshire—Screened steam coal, 14s. 6d. to 15s. 6d.; gas coke, 25s. to 25s. 6d.; furnace coke, 17s. 6d. to 18s. 6d. per ton.

Average quotations in Lancashire: Lancashire—Best house, 31s. to 32s.; good seconds, 27s. to 28s.; common, 19s. to 21s.; kitchen, 22s. to 24s.; Yorkshire selected house, 33s. to 34s.; Haigh Moor house, 30s. to 31s.; house, 26s. to 28s.; cobbles, 18s. to 20s.; washed doubles, 13s. to 14s.; and washed singles, 12s. to 13s. per ton in wagons at pit.

MIDLANDS.

Frost and snow have quickened the demand for domestic fuel, and the distributive plant is being called upon for larger deliveries under more difficult conditions. But the position at the pits is affected very little. There is so much coal on wharves and on rail that the increased requirements of householders can be met without calling for any greater output.

Middlemen have incurred such heavy losses through over-estimation of the probable strength of demand and the trend of prices that they are extremely cautious about entering into commitments before they know what they are going to do with coal when they have got it. Costs of distribution tend to go higher in some departments; and prices have firmed up in the retail trade. Plentiful supplies prevent any upward movement in pithead prices, save in special cases where particular grades are concerned.

The market for steams and general industrial fuel is no stronger. Restriction of output has brought about a more equable position as regards slacks and smalls. Collieries are no longer driven to take any price offered; and in view of the control scheme proposed for the Yorkshire, Derbyshire, and Nottinghamshire coalfields the policy of holding reserves is considered less dangerous. For good nutty slacks 7s. and 8s. is generally required, though purchases have been made at 6s. In the case of "D.S." nuts, the bulk of the business has passed at 11s. to 12s.

Heathfield and Waldron Gas Light and Coke Company.

On Tuesday, Dec. 13, in the Chancery Division, Mr. Justice Romer had again before him the petition by Messrs. Hull, Blyth, & Co., Ltd., of Lloyd's Avenue, London, E.C., for the winding-up of the Heathfield and Waldron Gas Light and Coke Company, Ltd. Petitioners were creditors for £75 for goods supplied. It was now stated by Counsel that arrangements had been made for the payment of the debt, with costs; and it was asked that the petition should be dismissed. His LORDSHIP thereupon dismissed the petition, with costs.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 19.

In the London market pitch is rather quiet; but the price remains steady at about 90s. per ton f.o.b.

Creosote continues exceedingly firm at not below 9d. per gallon free alongside export steamer.

Tar spirits remain unchanged; pure benzole being 1s. 5d. to 1s. 6d. per gallon, pure toluole about 1s. 10d. per gallon, 95/160 solvent naphtha 1s. 3d. per gallon, and pyridine about 6s. per gallon

Tar Products in the Provinces.

Dec. 19.

The tar products markets are still without change.

Pitch is very steady indeed; and while there is little demand from the Continent, there is no desire whatever on the part of manufacturers on this side to force sales. Small quantities are reported to have been sold for near delivery at full rates.

Creosote remains exceedingly firm, and for export there is a distinct shortage for near delivery.

There is little or no change in the market for water-white products. Naphthalene remains firm. There is a fair amount of inquiry for not only refined but also the better class of crude. Crude carbolic acid is very firm indeed. Crystals remain unchanged, and cresylic is still in good demand for delivery over the whole of next year.

The average prices of gas-works products during the week were: Gas-works tar, 61s. 6d. to 66s. 6d. Pitch—East Coast, 85s. to 86s. f.o.b. West Coast: Manchester, 80s. to 81s.; Liverpool, 83s. to 83s. 6d.; Clyde, 84s. to 85s. Benzole, 90 p.ct., North, 1s. 1d. to 1s. 2d.; crude, 65 p.ct. at 120° C., 10d. to 10½d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 9½d. to 10d. Heavy naphtha, North, 10d. to 1s. Creosote, in bulk, North, liquid, 7½d. to 7⅝d.; salty, 7⅛d. to 7½d.; Scotland, 7½d. to 7⅝d. Heavy oils, in bulk, North, 8⅜d. to 9½d. Carbolic acid, 60 p.ct., 2s. 4d. to 2s. 5d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Gas Explosion at Nuneaton.—Damage was caused recently by an explosion at the Warwickshire County Mining School, Nuneaton. A plumber named Smith and his apprentice Hodgetts were putting in a new gas service, to the lecture room, and Smith had turned on the gas when there was a loud report. The side of the building, a wooden one, was blown out. Smith was thrown on to some waste ground, while Hodgetts was struck by falling woodwork.

Price of Gas in Birmingham.—At the last meeting of the Birmingham City Council, Mr. Eyton moved an amendment to the Gas Committee's report instructing the Gas Committee to consider the reduction of the price of gas supplied for domestic purposes, and to report at the January meeting of the Council. He spoke mainly on behalf of users who obtain their gas through prepayment meters, declaring that they were charged on an exorbitant scale. Alderman J. H. Lloyd (Chairman of the Gas Committee), in reply, declined to accept the amendment. The suggestion, he said, was premature. The Committee hoped this year to be able to make the agreed contribution to the borough fund; but until the accounts were prepared it was impossible to forecast the future. The price of gas had been reduced, and was now at the level at which it stood before the coal stoppage. The amendment was lost, and the report of the Committee was then approved.

The Bradford Corporation Gas Committee have decided that they can take no action in response to a recent inquiry from the Bingley Urban District Council as to whether the Corporation would be prepared to sell to the Council that part of the Bradford gas undertaking which is in the Wilsden portion of the Bingley Council's administrative area.

Messrs. Ryde, Sons, & Browne, of 49-50, Parliament Street, Westminster, S.W. 1, announce that, owing to the approaching termination of their lease and lack of space in their present offices, they are removing to 2, Central Buildings, Matthew Parker Street, Westminster, S.W. 1, to which address all communications should be sent after Christmas Day. Their telegraphic address and telephone number will remain unaltered.

The Nottingham Corporation lamplighting staff last week had their first annual dinner, which was attended by Alderman Sir Albert Ball (Chairman of the Gas Committee) and Mr. John Wilkinson (Engineer and Manager). Proposing the principal toast, Sir Albert said he claimed to know something about gas lighting, as members of his family fixed the first lamp standard utilized in the Lenton district of the city. He also remembered himself fixing, 46 years ago, the columns of a number of lamps. He was glad to be able to say that in no large gas undertaking in the country did better relationships exist between the management and the men than in Nottingham.

STOCK MARKET REPORT.

BUYING of investment stocks was the most encouraging feature on the Stock Exchange last week. The 4 p.ct. Consolidated Loan was perhaps most in demand, and the price advanced appreciably. Both Victory Bonds and Funding Loan showed improvements. The appearance of another big New South Wales loan on particularly attractive terms was a temporary check to Dominion issues, but the demand for recent scrips still persisted. There were many buyers of the new Port of London stock; and with the "stags" sitting tight, the price rose to 1 5/16 premium.

European loans were on the whole brighter, and the easing of the tension between Poland and Lithuania brought about a sharp rally in the Polish loan.

There were several prominent features in the Industrial Market; the most spectacular being the big jump in Triplex Safety Glass shares. These £1 shares, which in October could be bought for £2 17s. 6d., are quoted for the next account at over £13 2s. 6d. This enormous rise, which is not justified by past profits, is due to new contract rumours. Considerable support was given to Mond Nickel shares, which registered a fresh high record; and Tobacco and Gramophone shares continued to advance.

With the close approach of the end of the year, it is not surprising that Gas Stocks are becoming more active. It is safe to predict satisfactory results; and it is expected that the low price of coal combined with, in most cases, a high price of gas will restore the amounts carried forward (depleted in the year 1926) to a figure favourably comparable with the balances shown in 1925. The number of transactions recorded was up to expectations; and while there was one fall in the quotations—that of Brighton and Hove 6 p.ct. 1 point to 108-111—five companies registered improvements, the most prominent being a rise of 3 points in Barnet ordinary to 105-108.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 92⅛, Bombay 21s. 10½d., Brighton and Hove 5 p.ct. 100, Cape Town 4½ p.ct. debenture 74⅝, Colonial 8 p.ct. preference 21s., Commercial 94, Croydon sliding-scale 100, European 7⅞, Gas Light and Coke 88¼, 88⅜, 88¼, 3½ p.ct. 62⅜, Imperial Continental 144, 145, Ottoman 3s., Primitiva 19s. 4½d., 19s. 6d., 19s. 9d., South Metropolitan 103¼, 6½ p.ct. debenture 102½, Swansea 7 p.ct. preference 104½, 104¼, Tottenham "B" 91, 92, 4 p.ct. debenture 73½, Wandsworth 3 p.ct. debenture 58¼. Supplementary prices, Croydon 7 p.ct. debenture 102½.

On Tuesday, Aldershot "C" 71½, Alliance and Dublin 92¼, 92⅛, 92⅜, 93⅛, 93½, 94, Bombay 22s. 3d., British 111, 111½, 112, Continental Union 28½, European 7⅜, 7⅞, 8, Gas Light and Coke 88¼, 88⅜, 4 p.ct. preference 77⅛, 78½, 3 p.ct. debenture 60½, 60¾, Imperial Continental 143½, 144, 145, Newcastle and Gateshead 3⅛ p.ct. 74½, Primitiva 19s. 3d., 19s. 4½d., 19s. 6d., South Metropolitan 102½, 103, 103½, 6½ p.ct. debenture 102⅜, Wandsworth, Wimbledon "A" 5 p.ct. 126½, 127½, "B" 106½, 107, 3 p.ct. debenture 58½. Supplementary prices, Croydon 7 p.ct. debenture 103, 103½, Ottoman 7 p.ct. preference 5s.

On Wednesday, British 111½, 112, 7 p.ct. preference 115½, European 7⅜, 7⅞, Gas Light and Coke 88⅜, 4 p.ct. preference 77½, Primitiva 19s. 6d., South Metropolitan 102½, 103, 103⅞, Wandsworth, Wimbledon stock, 103½. Supplementary prices, Waltham and Cheshunt 7 p.ct. 9⅜.

On Thursday, Aldershot 4 p.ct. preference 70½, 71, Alliance and Dublin 93, 94, Bournemouth 5 p.ct. 13, 13½, 6 p.ct. preference 11½, Croydon 101, Gas Light and Coke 88, 89, 3½ p.ct. maximum 62½, Imperial Continental 145, 145⅜, Montevideo 91½, 92, Primitiva 19s. 3d., 19s. 6d., South Metropolitan 103½. Supplementary prices, Hastings and St. Leonards 3½ p.ct. debenture 61, York 65½.

On Friday, Alliance and Dublin 93, Croydon sliding-scale 100½, 100½, European 7⅞, Gas Light and Coke 88½, 88⅝, 89, 89½, 3½ p.ct. maximum 62, 62¼, 4 p.ct. preference 78¼, 78½, Imperial Continental 144, Primitiva 19s. 3d., 19s. 6d., 19s. 9d., South Metropolitan 102⅝, 102⅞, 3 p.ct. debenture 61, Tottenham 4 p.ct. debenture 73. Supplementary prices, Herne Bay 6½ p.ct. preference 5½, North Middlesex 6 p.ct. preference 105.

Funds were plentiful in Lombard Street at the close of the week, and loan rates declined. While 3½ p.ct. was charged for renewals of regular market loans, new money was obtainable at as low as 3 p.ct. With the end of the year close at hand, the clearing banks were doing little in bills, and the discount market was quiet. Treasury Bills were allotted at 3½d. p.ct. above the previous week's rate at £4 6s. 6'55d. p.ct.

The American Exchange moved against sterling at the end of the week—the closing rate being 4.88 5/16. A similar tendency prevailed with regard to forward rates of the Italian and French currencies. Belgas were dearer at 34.89½; Spanish pesetas reacted and closed 11c. higher at 29.27; and the Berlin rate 1 pf. lower at 20.43¼.

Silver rose 1/16d. for cash to 26 13/16d. per oz., support being forthcoming from China, India, and America; while Gold remained at 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

Issue.	Share.	When ex-Dividend	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr	NAME.	Quotations. Dec. 16.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			%p.a	% p.a.				
2171,978	Stk.	Sept. 8	5	5	Aldershot 5 p.c. max.	68—73	..	71½
923,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—72	+2	70½—71
1,651,888	,,	Sept. 29	7	7	Alliance & Dublin Ord.	90—94	..	92⅛—91
874,000	,,	July 14	4	4	Do. 4 p.c. Deb.	64—67	..	..
522,654	,,	Aug. 15	—	7	Barnet Ord. 7 p.c.	3105—108	+3	..
1800,000	£	Oct. 13	1/7½	1/7½	Bombay, Ltd.	21/6—22/6	..	21/10¼—22/3
170,000	10	Aug. 25	8½	8½	Bournemouth 5 p.c.	12½—13½	..	13—13½
500,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
1275,000	10	,,	6	6	Do. Pref. 6 p.c.	10⅜—11½	..	11⅛
50,000	Stk.	June 29	3	3	Do. 3 p.c. Deb.	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
357,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	109—111	−1	..
341,800	,,		—	6/8/6⅔	Do. 5 p.c. Con.	98—101	..	100
1,387,500	,,	July 28	5	5	Bristol 5 p.c. max.	87—88a	..	..
855,000	,,	Sept 29	7	8	British Ord.	109—112	..	111—112
100,000	,,	June 29	7	7	Do. 7 p.c. Pref.	114—117	..	115½
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	74—77	..	..
200,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb.	95—98	..	..
100,000	10	Nov. 24	8	6	Cape Town, Ltd.	7—8	..	..
100,000	10	Oct 27	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 29	4½	4½	Do. 4½ p.c. Deb.	70—75	..	74⅜
626,880	,,	July 23	6	6	Cardiff Con. Ord.	100—103	..	..
227,880	,,	June 29	7½	7½	Do. 7½ p.c. Red. Deb.	103—106	..	..
187,150	,,	Aug. 11	5½	5	Chester 5 p.c. Ord.	87—93b	..	..
79,185	1	Oct. 13	†2/-	†2/-	Colombo Ltd. Ord.	31/—33/-	..	..
24,495	1	,,	1/1½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
221,490	1	Oct. 13	1/92	1/93	Colonial Gas Assn. Ld. Ord	24/—26/-	..	..
173,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	21/-
3,073,280	Stk.	July 14	—	5	Commercial Ord.	93—95	+1	94
475,000	,,	June 16	3	3	Do 3 p.c. Deb.	56—59	..	..
800,000	,,	Sept 29	†1	†1	Continental Union, Ltd.	28—33	..	28½
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	87—92	..	..
787,560	,,	Aug. 11	6½	6½	Croydon sliding scale	98—101	..	100—101
468,100	,, *	,,	5	5	Do. max. div.	80—83	..	..
492,270	,,	Aug. 25	9	6	Derby Con.	108—105c	..	..
55,000	,,	June 29	4	4	Do. Deb.	78—75c	..	..
309,000	,,	Aug. 25	5	5	East Hull Ord. 5 p.c.	78—81	..	..
80,000	,,	June 16	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
1,008,180	10	Sept. 29	†3	†4	European, Ltd.	7⅜ 8⅛	−⅛	7⅜—8
5,747,460	Stk.	July 28	5	5	Gas Light & Coke 4 p.c. Ord.	88—90	+1	8⅝—89¼
3,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	62—64	..	62—62⅜
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	76—79	..	77½—78½
5,609,620	,,	June 16	3	3	Do. 3 p.c. Con. Deb.	60—62	..	60½—60⅝
781,815	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	102 105	..	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—101	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Aug. 25	6⅜	6⅜	Hastings & St L. 5 p.c. Conv	88—91	..	..
988,740	,,	,,	5⅝	5⅝	Do. 5½ p.c. Conv.	72—75	..	..
70,000	10	Oct. 18	†10	†10	Hongkong & China, Ltd.	12—18	..	..
172,200	Stk.	Aug. 25	5	5	Hornsey Con. 5½ p.c.	73—76	..	..
1,976,006	,,	Nov. 10	10	10	Imperial Continental Cap.	143—146	+2	143½—145⅜
283,180	,,	Aug. 11	3½	3½	Do. 3½ p.c. Red. Deb.	68—70	..	..
295,942	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord.	96—99	+2	..
2,145,907	,,	Aug. 11	5½	5½	Liverpool 5 p.c. Ord.	89—895	−½	..
600,000	,,	Sept 29	7	7	Do. 7 p.c. Red. Pref.	103—105b	+2	..
165,786	,,	Aug. 25	8	9	Maidstone 5 p.c. Cap.	107—112	..	..
75,000	5	June 16	†7	†8	Malta & Mediterranean	5½—6	..	..
841,920	Stk.	Nov. 24	†7	†5	Montevideo, Ltd.	89—91	..	91½—92
2,061,815	,,	July 28	5	5	Newcastle & Gateshead Con.	77⅜—78½d	..	..
860,929	,,	,,	4	4	Do. 4 p.c. Pref.	67⅝—68¾d	..	..
691,705	,,	June 29	3½	3½	Do. 3½ p.c. Deb.	66⅛—67⅛d	..	..
131,785	,,	Aug. 25	—	6/18/0	North Middlesex 6 p.c. Con.	93—96	..	..
300,000	,,	Nov. 24	7	9	Oriental, Ltd.	105—110	..	..
188,130	,,	June 29	7½	7½	Plym'th & Ston'house 5 p.c.	105—110	..	..
414,500	,,	Aug. 25	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	102—105	..	..
226,782	,,	,,	5	5	Do. 5 p.c. max.	76—79	..	..
2,389,909	1	—	—	—	Primitiva Ord.	19/—20/-	−/3	19/3—19/9
283,200	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	86—89	..	..
800,000	Stk.	July 28	4	4	Do. 4 p.c. Red. Deb. 1911	73—75	..	..
434,968	,,	June 29	—	4	Do. 4 p.c. Cons. Deb.	73—75	..	..
180,000	10	Sept. 29	6	6	San Paulo 6 p.c. Pref.	8½—8⅝	..	..
195,000	50	June 29	5	5	Do. 5 p.c. Red. Deb.	47—49	..	..
370,000	Stk.	Sept. 8	5⅜	5⅜	Sheffield A	102—104e	..	..
419,968	,,	,,	5⅜	5⅜	Do. B	102—104e	..	..
1,047,000	,,	,,	5½	5½	Do. C	102—104e	..	..
90,000	10	May 26	4	6	South African	4—6	..	..
6,609,895	Stk.	Aug. 11	7	5	South Met. Ord.	102—104	..	102¼—103½
500,000	,,	—	—	—	Do. 6 p.c. Irred. Pf.	110—113	..	..
1,895,445	,,	July 14	3	3	Do. 3 p.c. Deb.	59—62	..	61
784,000	,,	Sept. 8	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	102½—102⅝
91,500	,,	Aug. 11	8½	8½	South Shields Con.	101—103d	..	..
1,943,795	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	102—105	..	..
858,837	,,	June 16	5	5	Do. 5 p.c. Deb.	93 96	..	..
647,740	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c. max	76—78	..	..
191,975	,,	June 29	4	4	Do. 4 p.c. Deb.	73—76	..	..
350,000	,,	Aug. 25	7	7	Swansea 7 p.c. Red. Pref.	103—106	..	104½—104⅝
300,000	,,	June 16	6½	6½	Do. 6½ p.c. Red. Deb.	100—103	..	..
130,000	,,	July 28	7½	7½	Tottenham District A 5 p.c.	105—108	..	..
883,275	,,	,,	6½	6½	Do. B 3½ p.c.	89—92	..	91—92
180,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
181,355	,,	Dec. 8	4	4	Do. 4 p.c. Deb.	73—76*	..	73—73½
258,951	,,	Sept. 29	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	81—83d	..	..
289,094	,,	Aug. 25	6½	6½	Do. 5 p.c. pref.	85—90	..	..
88,830	,,	,,	5	5	Wandsworth, Wimbledon, and Epsom—	88—88	..	..
					Wandsworth A 5 p.c.			
80,000	,,	July 14	8½	8½	Do. B 3½ p.c.	125—130	..	126½—127½
255,636	,,	,,	7	7	Do. C and New	105—110	..	106½—107
493,585	,,	,,	5/19/0	6/19/0	Do. Wimbledon 5 p.c.	90—95	..	..
352,000	,,	,,	6⅞	6⅞	Do. Epsom 5 p.c.	100—105	..	103½
98,000	,,	,,	7½	7½	Do. 5 p.c. Pref.	107—112	..	..
200,000	,,	,,	5	5	Do. 3 p.c. Deb.	85—90	..	..
88,416	,,	June 29	3	3	Do. 4 p.c. Deb.	56—69	..	58½—58⅝
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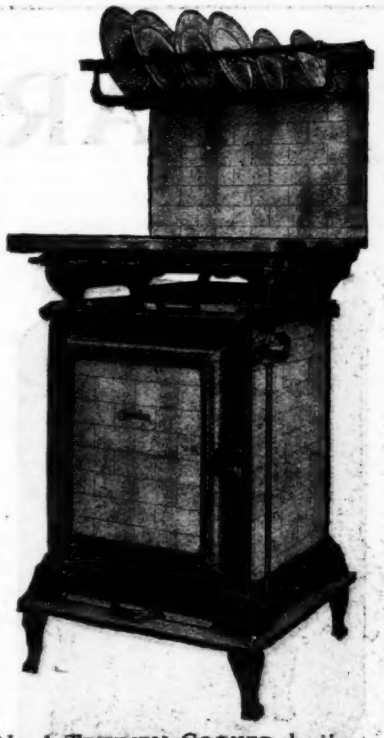

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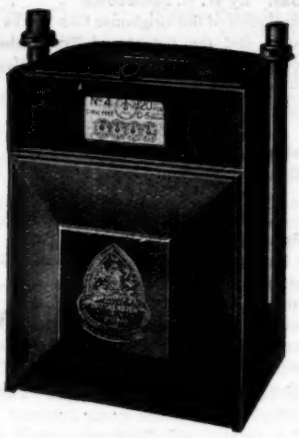

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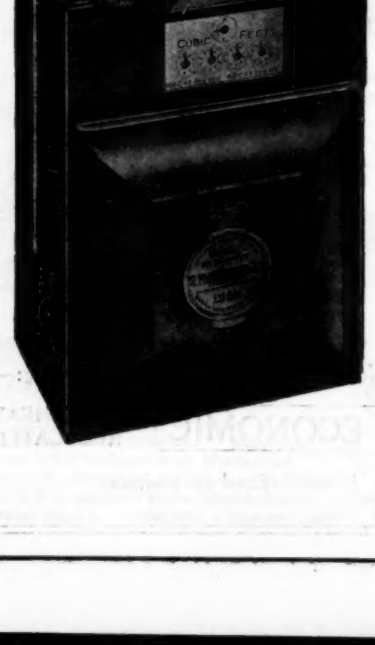

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